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VIA ECFS

Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Re: *Ex Parte Presentation*
GN Docket Nos. 12-268, 13-185
Expanding the Economic and Innovation Opportunities of Spectrum Through
Incentive Auctions

Dear Ms. Dortch:

The Wireless Telecommunications Bureau (“WTB”) recently asked stakeholders to comment on “a Proposal to license the 600 MHz band using ‘Partial Economic Areas.’”¹ National Economic Research Associates, Inc. (“NERA”) very much appreciates the opportunity to present this report in response to the WTB Public Notice. Please find our report that reviews the advantages and disadvantages of this proposal. This research was supported by NTCA – The Rural Broadband Association and the Rural Wireless Association, Inc.

We look forward to an opportunity to discuss our report with you. Please do not hesitate to contact Richard Marsden at 212-345-2981 if you have any questions about our submission.

Sincerely yours,

Richard Marsden,
Vice President, NERA

¹ Wireless Telecommunications Bureau Seeks Comment on a Proposal to License the 600 MHz Band Using “Partial Economic Areas”, GN Docket No. 12-268, GN Docket No. 13-185, Public Notice, DA 13-2351 (Dec. 11, 2013)



Local and Regional Licensing for the US 600 MHz Band (Incentive Auction)

A NERA report

January 2014

Acknowledgement: This research was supported by the NTCA – The Rural Broadband Association (NTCA) and the Rural Wireless Association, Inc. (RWA). The views herein are those of the authors and do not necessarily represent the views of the NTCA, RWA or their members.

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REPORT QUALIFICATIONS/ASSUMPTIONS & LIMITING CONDITIONS

NERA Economic Consulting was commissioned by NTCA – The Rural Association (NTCA)¹ and the Rural Wireless Association, Inc. (RWA)² to explore the arguments for and against using smaller geographic area licenses for the Forward Auction of the 600 MHz Broadcast Incentive Auction (Incentive Auction), and any changes to the auction rules that could facilitate using smaller license areas. The primary audience for this report includes the FCC and other parties interested in the design of the 600 MHz Incentive Auction.

NERA Economic Consulting shall not have any liability to any third party in respect of this report or any actions taken or decisions made as a consequence of the results, advice or recommendations set forth herein.

The opinions expressed herein are valid only for the purpose stated herein and as of the date hereof. Information furnished by others, upon which all or portions of this report are based, is believed to be reliable but has not been verified. No warranty is given as to the accuracy of such information. Public information and industry and statistical data are from sources NERA Economic Consulting deems to be reliable; however, NERA Economic Consulting makes no representation as to the accuracy or completeness of such information and has accepted the information without further verification. No responsibility is taken for changes in market conditions or laws or regulations and no obligation is assumed to revise this report to reflect changes, events or conditions, which occur subsequent to the date hereof.

¹ NTCA – The Rural Broadband Association represents nearly 900 rural rate-of-return regulated telecommunications providers. All of NTCA's members are full service local exchange carriers and broadband providers, and many provide wireless, video, satellite, and/or long distance services as well.

² The Rural Wireless Association, Inc., formerly known as the Rural Telecommunications Group, Inc., is a 501(c)(6) trade association dedicated to promoting wireless opportunities for rural wireless companies who serve rural consumers and those consumers traveling to rural America. RWA's members are small businesses serving or seeking to serve secondary, tertiary, and rural markets. RWA's members are comprised of both independent wireless carriers and wireless carriers that are affiliated with rural telephone companies. Each of RWA's member companies serves fewer than 100,000 subscribers.

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Executive Summary

The Federal Communications Commission (FCC) recently published detailed proposals for the design of the so-called Incentive Auction, which, if successful, will reallocate 600 MHz spectrum away from broadcasters, and create a new band suitable for the provision of mobile wireless services. A key component of the Incentive Auction is the Forward Auction, in which spectrum will be awarded to wireless operators. The FCC has proposed licensing this spectrum using Economic Areas (EAs) that divide the United States into 176 regions.

This paper explores the arguments for and against using smaller geographic license areas, such as Cellular Market Areas (CMAs), instead of EAs. We conclude that there is a compelling case for defining smaller areas that are more tailored to the demands of potential bidders. We also propose that the Forward Auction be conducted in two sequential bidding phases, consisting of one phase for urban areas primarily based on the EA licensing structure, followed by a second phase of bidding for rural areas, primarily based on the RSA³ licensing structure. We call this the Sequential Forward Auctions approach. It is designed specifically to address concerns about aggregation risk and implementation complexity associated with expanding the number of license areas in the Forward Auction.

The general concept underpinning the definition of a geographic area for a spectrum auction is that it should cover a population that provides a coherent economic market for deploying and offering mobile wireless services. The FCC's proposal to use EAs in the Forward Auction is strongly opposed by local operators and their representatives, who argue that EAs are too large and would create an insurmountable obstacle to them participating in the auction. There appear to be many examples of small local operators whose current footprints are a reasonable fit with CMAs but a poor fit with EAs.

Licensing spectrum using smaller license areas is associated with a number of potential benefits. It may maximize the role of the market in determining allocation, as it is more likely that all types of demand will be represented and tested in the auction. It may also best fulfill the FCC's statutory obligations to promote economic opportunity for small businesses and rural carriers, and deployment of services to rural areas, including its mandate under Section 309(j) of the Communications Act. Finally, it supports maximum granularity in determining the availability of spectrum reclaimed from broadcasters. However, there are also benefits associated with having fewer, larger licenses. This may mitigate aggregation risk for national and large regional bidders, thus giving them greater security to express the full value of their demand. Having fewer licenses may also facilitate auction implementation by reducing complexity for the auctioneer and for some bidders.

³ CMAs consist of Metropolitan Statistical Areas (MSAs), which are focused on urban areas, and Rural Service Areas (RSAs) which cover the rest of the country.

Local operators and their representatives generally prefer licensing at the CMA level, but this would mean an increase in the number of license areas from 176 to 734. Large operators oppose this change, primarily on the basis that it will expose bidders to aggregation risk. Most of the additional licenses would be rural, so we doubt this shift would greatly affect the exposure of a national bidder to failing to win a critical mass of population coverage. However, it may increase their exposure to winning an unwanted subset of their demand.

We have not identified any reason why the ascending clock auction design proposed for the Forward Auction could not be adapted to cope with many more license areas than the 176 areas that would be auctioned using EAs. It could probably be made to work for an auction of all 734 CMAs. Given the importance that the FCC and Congress attach to the Incentive Auction being a success, it is perhaps not surprising that the FCC's preliminary preference may have been to license the spectrum on the basis of larger lots. But while there are implementation risks that increase with an expansion in the number of geographic areas, for example with respect to bid submission, none of these implementation risks appear insurmountable.

Ultimately the FCC will have to decide on the approach that it believes maximizes broader benefits, even if this is to the detriment of some stakeholders. This raises two obvious questions which we explore in this paper: firstly, is there a way to constrain the increase in the number of licenses while still meeting the needs of smaller operators; and secondly, are there changes in the design of the Forward Auction that the FCC could make, so as to accommodate the interests of a broader range of stakeholders? We believe the answer to both questions is yes.

With respect to the number of licenses, we propose that the FCC explore further the proposal, currently under consultation, to "right-size" licenses using Partial Economic Areas (PEAs).⁴ Some form of PEAs, based on a mixture of EA and CMA boundaries, could provide a framework for the FCC to restructure the available licenses so they are more consistent with operator needs within the framework of existing geographic tier boundaries. The specific proposal for PEA boundaries submitted by CCA⁵ is just one of many possible approaches the FCC could take to defining this new tier level. However, CCA's proposal would likely work for some smaller operators but not for all of them. As a starting point for a more systematic analysis of optimal boundaries, we propose that urban areas (represented by Metropolitan Statistical Area (MSA) licenses) should generally be awarded on an EA basis, but that rural areas (represented by RSA licenses) should be sold separately.

With respect to auction design, there are a number of approaches commonly used to accommodate bidders with disparate demands. For example, in past auctions, the FCC has made

⁴ Wireless Telecommunications Bureau Seeks Comment on a Proposal to License the 600 MHz Band Using "Partial Economic Areas", GN Docket No. 12-268, GN Docket No. 13-185, Public Notice, DA 13-2351 (Dec. 11, 2013) ("PEA PN").

⁵ *Ex Parte* Presentation from Competitive Carriers Association to Marlene Dortch, GN Docket No. 12-268 (Nov. 27, 2013) ("CCA *Ex Parte*"); *see also* *Ex Parte* Letter from Competitive Carriers Association to Marlene Dortch, GN Docket No. 12-268 (Dec. 23, 2013) ("CCA *Ex Parte* 2").

spectrum blocks available at different geographic tier levels, and used activity rules, such as staged activity requirements and withdrawals, to manage aggregation risk. We disregard these specific measures as they are not obviously compatible with the proposed clock auction design. Another approach, supported by some national bidders, is package bidding, which could be used in a clock auction context. However, package bidding is controversial, owing to implementation complexity and strong opposition from small bidders, who fear they will be unable to compete against large package bids submitted by national bidders.

We focus on sequencing the award of available lots. Our specific proposal is for a two-phase Forward Auction. In the First Phase Forward Auction, licenses covering urban areas accounting for over 90% of the total value will be sold. The results of this auction will determine the supply scenario, based on linkages to the broadcaster Reverse Auction. In the Second Phase Forward Auction, rural areas will be sold. For the avoidance of doubt, we propose that both auctions remain part of the broader Incentive Auction, and that bidders would have the opportunity to make a single application to participate in both phases. The assignment round could take place as planned after completion of the two bidding phases.

We believe that this approach addresses concerns about participation of small bidders and the role of the market in determining allocation. By right-sizing licenses based on operator demands and sequencing the sale of rural licenses after urban ones, it should reduce aggregation risk. Sequencing the Forward Auction also facilitates an expansion in the number of licenses without increasing implementation risk. The First Phase Forward Auction has a similar structure to the single Forward Auction with EA licensing, so it should be relatively straightforward to implement. As the First Phase Forward Auction should account for more than 90% of total revenues, it is also the most material to the financial success of the broader Incentive Auction. The implementation complexity of dealing with larger numbers of licenses is limited to the Second Phase Forward Auction, which can take place after the supply scenario has been finalized.

I. Introduction

The Federal Communications Commission (FCC) recently published a notice of proposed rulemaking on expanding the economic and innovative opportunities of spectrum through incentive auctions (Notice 12-268).⁶ This notice includes detailed proposals for the design of the proposed Incentive Auction which, if successful, will reallocate the 600 MHz spectrum band away from broadcasters, and create a new spectrum band suitable for the provision of mobile wireless services using next generation cellular technologies.

Under the FCC's proposal, *"the Incentive Auction of broadcast television spectrum will have three major pieces:*

1. *a "reverse auction" in which broadcast television licensees submit bids to voluntarily relinquish spectrum usage rights in exchange for payments;*
2. *a reorganization or "repacking" of the broadcast television bands in order to free up a portion of the ultra high frequency (UHF) band for other uses; and*
3. *a "Forward Auction" of initial licenses for flexible use of the newly available spectrum."*⁷

This paper focuses on the design of the Forward Auction only. Specifically, it addresses the debate over the level of geographic area licensing to be used for lots included in the auction, and the related debate over the introduction of package bidding.

Under Section 6403(c)(3) of the Spectrum Act, the FCC is directed to *"consider assigning licenses that cover geographic areas of a variety of different sizes."*⁸ In Notice 12-268, the FCC proposes to make licenses available at the Economic Area (EA) level, which divides the country into 176 regions.⁹ A paper produced for the FCC by their outside auction experts, Auctionomics and Power Auctions, which provides a set of potential rules for the auction, also assumes that licenses will be made available in each of the 176 EAs.¹⁰ However, as the FCC observes in the Notice, there are arguments that may be made for using either smaller or larger area licenses. Accordingly, it has requested for comment on its proposal:

⁶ Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions, Notice of Proposed Rulemaking, 27 FCC Rcd 12357 (2012) ("Notice 12-268").

⁷ Notice 12-268, p. 3.

⁸ Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, §§ 6402, 6403, 125 Stat. 156 (2012) ("Spectrum Act"), § 6403(c)(3).

⁹ Notice 12-268, p. 53-56.

¹⁰ Auctionomics and Power Auctions, Incentive Auction Rules Option and Discussion, p. 14 (Sept. 12, 2012).

“We propose to license the 600 MHz band on an EA basis and seek comment on this approach. We ask commenters to discuss and quantify the economic, technical, and other public interest considerations of licensing on an EA basis, as well as the impacts this approach may have on auction design, rural service, and competition.

We also seek comment on whether we should use geographic areas other than EAs. Specifically, we seek comment on using geographic areas such as CEAs or MSAs/RSAs, which have a greater number of service areas throughout the United States and the reasons why using these geographic license sizes are more advantageous than using EAs. We also seek comment on whether there are certain circumstances in which using larger – nationwide or regional – licenses would be more appropriate or advantageous. For example, if we are able to reclaim a large amount of broadcast television spectrum nationwide or regionally, should we license a portion of the spectrum on a nationwide or regional basis? We encourage commenters to consider the auction design implications of any proposed geographical licensing scheme, as well as any associated costs and benefits.”¹¹

The FCC has already received a number of responses from stakeholders pertaining to the geographic license areas for the Forward Auction. Opinions vary widely, some for and some against using smaller area licensing, such as Cellular Market Areas (CMAs), which divide the country into 734 areas.¹² Amongst these, the Competitive Carriers Association (CCA) submitted an alternative proposed scheme for smaller license areas using a new approach that it calls Partial Economic Areas (PEAs), which splits the country into 351 regions¹³ (later revised upwards to 390 in a subsequent filing to the FCC¹⁴), based on a mixture of EA and CMA boundaries. In response to CCA’s initial submission, AT&T filed an ex parte letter urging the Commission to seek public comment on the PEA proposal and seek comment on *“how that proposal could be effectuated within a package-bidding framework.”*¹⁵ This in turn prompted a decision by the FCC’s Wireless Telecommunications Bureau (WTB), announced on December 11, 2013, to seek public comment on this approach, and any other proposals for geographic area licensing or approaches that may enable bidders to submit package bids combining multiple regions.¹⁶

The FCC describes the three pieces of the Incentive Auction as being *“interdependent,”* in that *“[f]or the incentive auction to succeed, all three pieces must work together.”*¹⁷ However, there do not appear to be any linkages between the choice of geographic licensing area in the Forward

¹¹ Notice 12-268, paras. 148-149.

¹² PEA PN at 1.

¹³ CCA Ex Parte.

¹⁴ CCA Ex Parte 2.

¹⁵ *Ex Parte* Letter from AT&T, Inc., to Marlene Dortch, GN Docket No. 12-268 (Dec. 3, 2013) (“AT&T Ex Parte”).

¹⁶ PEA PN, pp. 1-5.

¹⁷ Notice 12-268, pp. 53-56.

Auction and the other pieces, except indirectly to the extent that this decision may impact (a) the revenues raised, which at the margin may impact the amount of spectrum that is cleared; and (b) how quickly the auction can be executed, which may have an impact on the FCC proposals to run the Reverse Auction and Forward Auction in parallel. More specifically, the current proposals envisage that the FCC will clear the same spectrum band plan nationwide but with some regional variations in availability, notably in border areas with Canada and Mexico. In determining whether or not a particular spectrum supply can be cleared, the FCC will consider the revenue raised across all licenses in the auction. Whether or not this revenue comes from a division of the country into a few large regions or many smaller regions, or more revenues come from one part of the country than another, does not appear to matter in determining how much spectrum is cleared. Accordingly, in this paper, our discussion focuses primarily on the impact of particular licensing schemes on the bidders and on the auctioneer within the Forward Auction, and we make only limited comment on the other pieces of the Incentive Auction.

The FCC proposes to use an ascending clock auction format for the Forward Auction and a descending clock auction (its mirror twin) for the Reverse Auction. Variants of this format have been widely used for energy auctions in the United States and for spectrum auctions in other countries. This is a flexible format, arguably rather more so than the traditional simultaneous multiple round auction (SMRA) used for previous auctions of spectrum for mobile services. Notably, this approach allows bidders to bid for a quantity of substitutable lots in each license area, rather than bidding on individual lots. As a result, only one “clock” price is needed for each region (or possibly two if some downlink does not have an associated uplink), as opposed to the SMRA approach of having one price for every lot. For example, with 176 regions and say 6 lots per region, there would be only 176 clock prices, as opposed to 1,056 ($6 * 176$) with an SMRA.

A starting point for our analysis is that neither the design of the Forward Auction nor the broader Incentive Auction *per se* preclude expanding the number of licenses in the auction. Rather, the decision on whether to use smaller or larger licensing areas is a policy decision, for which the FCC must make a judgment based on a series of relevant criteria. We observe that there are good arguments for using licenses smaller than the EA level on both economic and public policy grounds, but that there are also downsides to expanding the number of licenses. To strike a balance that may help to resolve this dilemma, we propose a radical but quite simple alternative plan:

- use of “right-sized” regional licenses, using an approach that builds on the PEA proposal; and
- division of the Forward Auction into two bidding phases, the first for predominantly urban areas, which will account for the lion’s share of the U.S. population and auction revenues, and the second for remaining rural areas.

As we propose that the second bidding phase take place after the first one, we call this the “Sequential Forward Auctions” approach. To be clear, although these bidding phases would have the characteristics of separate auctions, we envisage that they would take place within the framework of a single Forward Auction process, so bidders could make a single application to

participate in one or both phases. This approach is designed specifically to address concerns about aggregation risk and implementation complexity associated with expanding the number of license areas in the Forward Auction.

Our report is divided into six further sections:

- Section II provides some background on the FCC’s use of geographic area licensing for auctions of spectrum for mobile wireless services;
- Section III introduces a set of criteria that may be used for evaluating the pros and cons of smaller versus larger license areas;
- Section IV describes the “Sequential Forward Auctions” approach, which is designed with the objective of facilitating participation of small, local and regional bidders in the Forward Auction, while alleviating some of the concerns with having smaller licenses;
- Section V provides an evaluation of the Sequential Forward Auctions approach, based on the same criteria that we developed in Section III;
- Section VI explores how the adoption of the Sequential Forward Auctions approach may impact the scope for introducing more package bidding in the Forward Auction; and
- Section VII summarizes our conclusions.

II. The FCC's use of geographic area licensing

Geographic area licensing has always been a central consideration in the FCC's approach to the award of spectrum for commercial mobile wireless services. In the early years of mobile services, licensing spectrum at a local level facilitated the emergence of many local and regional operators. In more recent years, there has been significant market consolidation, with the emergence of four large national players, but many dozen smaller local and regional operators remain.

The general concept underpinning the definition of a geographic area for a spectrum auction is that it should cover a population that provides a coherent economic market for rolling out mobile wireless services. In past auctions, the FCC has used four different tiers of geographic licensing in spectrum auctions:

- *Nationwide licensing.* The continental United States is defined as a single region. Outlying states and territories may or may not be included in such a license.
- *Large size:* Regional Economic Area Groups (REAGs) consist of 12 licenses which are supersets of Economic Areas (EAs) (discussed below), grouped by region and population. Alternatively, Major Economic Areas (MEAs) divide the country into 52 regions.
- *Medium size:* EAs are defined as relevant regional markets surrounding one or more metropolitan statistical area (MSA) that serve as regional centers of economic activity and the surrounding counties that are economically related to these nodes. If there is no MSA in a region, an EA may be based on one or more micropolitan area (rural center).
- *Smaller size:* Cellular Market Areas (CMAs), which consist of Metropolitan Statistical Areas (MSAs) and Rural Service Areas (RSAs), are based on the concepts of metropolitan and micropolitan nodes. MSAs largely nest within EA boundaries (with only three minor exceptions) whereas RSA boundaries often vary. A map showing the location of MSAs and RSAs against EA boundaries is provided in Exhibit 1 at the end of this section.

To specify these areas, the FCC relies on the work of the Bureau of Economic Analysis, which defines economic areas of various sizes for statistical purposes based on a variety of factors including urban population, population size, county boundaries and newspaper readership.¹⁸ Our understanding is that in defining these areas, no consideration is given to factors specific to mobile wireless, such as the footprints of local mobile operators or customer traffic use patterns. Rather, there is an implicit assumption that the definition of economic areas for statistical purposes is a reasonable proxy for defining a coherent market for mobile wireless services.

¹⁸ For a detailed description of the process for defining statistical areas, see, Kenneth P. Johnson and John R. Kort, 2004 *Redefinition of BEA Economic Areas*, Survey of Current Business, November 2004.

Table 1 compares the number and type of geographic licenses available under these different approaches, as well as a potential new tier level based on PEAs, discussed below. Approaches that allow for higher numbers of licenses make it possible not only for bidders to express much finer granulated demand for geographic areas, and they also provide much greater opportunity to target small and rural areas. One notable feature of such an approach is that because metro areas are generally kept together, expanding the number of licenses involves adding many more small population licenses but would have a much smaller impact on the number of large population licenses. For example, the number of regions with populations below 200,000 increases from 12 to 421, with the step change from EA to CMA, whereas the number of regions with a population above 1 million only decreases from 62 to 46.

Table 1: Comparison of Geographic Licensing Approach¹

| Approach | Total # licenses | Population type | | | Total Population | | | |
|------------------|------------------|------------------|-------------|-------|------------------|------------|-------------|------------------|
| | | > 75% Metro | > 75% Rural | Mixed | > 10m | < 10m > 1m | < 1m > 200K | < 200K |
| National | 1 | n/a | n/a | n/a | n/a | n/a | n/a | n/a |
| REAG | 12 | 5 | 2 | 4 | 6 | 2 | 2 | 2 ¹ |
| EA | 176 | 54 | 27 | 94 | 3 | 62 | 99 | 12 ¹ |
| PEA ² | 390 | 121 | 149 | 81 | 2 | 57 | 228 | 103 |
| CMA | 734 | 306 ¹ | 428 | 0 | 2 | 46 | 265 | 421 ¹ |

Notes: ¹ Licenses include Gulf of Mexico which has no permanent population.

² Numbers based on December 23 update submitted by CCA to the FCC.

Source: NERA using data from FCC Auctions Website and *CCA Ex Parte 2*.

In the majority of past auctions, the FCC has used the same geographic license area structure for all lots in the same band. However, in some auctions in the 2000s, notably the 700 MHz auction (Auction #73), the FCC experimented with varying the geographic structure across blocks in the same band, thereby creating lots that may appeal to different types of bidders, large and small. For the 700 MHz band, the FCC included blocks with National, REAG, EA and CMA licenses, an approach which had mixed results. Most positively, it created a basis for broad participation in the auction. More negatively, it is apparent from bidding behavior in the auction and disparate final price outcomes that bidders struggled with substitution risk across different sized lots.¹⁹ This created gaming opportunities and likely contributed to wide price divergences between sets of licenses that should have had broadly similar value.

¹⁹ For a description of some of these problems, see Peter Cramton, Spectrum Auction Design, *Review of Industrial Organization*, 42:2, March 2013.

For various reasons, the approach of using multiple geographic licensing regimes in a single auction looks particularly unattractive in the context of the Incentive Auction design. First, it would be very complicated. Because the band plan will be determined within the auction, any attempt to divide different lots into different geographic units would be dependent on the spectrum supply. Second, it may be even more difficult than normal for bidders to manage substitution risk across different sized geographic lots as the relative availability of different categories is supply dependent. Finally, the benefits of speed and simplicity from switching to a clock format, which are integral to the approach of running the Forward Auction and Reverse Auction in parallel, may be undermined because there would have to be separate clocks for each level of geographic unit used. Accordingly, we do not consider this approach further.

Most recently, the FCC has favored using the EA approach alone for major spectrum auctions. It has proposed using EAs for the H Block Spectrum Auction²⁰ and AWS-3 Auction,²¹ in addition to the Incentive Auction. It is apparent from its comments that the FCC views the EA unit as a potential compromise between arguments for smaller and larger licenses. For example, in relation to the Incentive Auction, the FCC comments that, *“for this spectrum, EA licensing strikes an appropriate balance between geographic granularity from a spectrum reclamation standpoint and having a manageable number of licenses from an auction design.”*²² However, while some stakeholders (mainly national operators) have supported this view, others (chiefly those representing smaller, local operators) have called for smaller licenses.²³

In November 2013, the WTB invited comments on the new PEA geographic area scheme developed by CCA.²⁴ A map showing the potential location of PEAs is provided in Exhibit 2 at the end of this section. CCA describes PEAs as *“a hybrid proposal based on EAs and CMAs”*:

“Although PEAs would not promote opportunities for smaller carriers to the same degree as CMAs, those geographic units would ensure that some licenses consist of large population centers while other PEAs consist of less populous areas, with the goal of attracting a variety of bidders, including carriers that would be foreclosed from bidding on entire EAs. Moreover, PEAs would not establish a wholly new geographic licensing scheme, as they respect existing CMA boundaries to the extent possible, consistent with

²⁰ *Service Rules for the Advanced Wireless Services H Block—Implementing Section 6401 of the Middle Class Tax Relief and Job Creation Act of 2012 Related to the 1915-1920 MHz and 1995-2000 Bands*, Report and Order, WT Docket No. 12-357, 28 FCC Rcd 9483, 9500-02, pp. 37, 45 (2013) (“H Block Rules”).

²¹ *Amendment of the Commission's Rules with Regard to Commercial Mobile Operations in the 1695-1710 MHz, 1755-1780 MHz, and 2155-2180 MHz Bands*, Notice of Proposed Rulemaking and Order on Reconsideration, GN Docket Nos. 13-185, et al., 28 FCC Rcd 11479, 11502-03 at 52 (2013).

²² Notice 12-268, p. 55.

²³ *See e.g.*, Comments of National Telecommunications Cooperative Association, Docket No. 12-268, pp. 3-5 (filed Jan. 25, 2013); Comments of Rural Telecommunications Group, Docket No. 12-268, pp. 1-7 (filed Jan. 25, 2013); Supplemental Comments of Competitive Carriers Association, Docket No. 12-268, pp. 7-10 (filed June 14, 2013); Comments of United States Cellular Corporation, Docket No. 12-268, pp. 19-25 (filed June 28, 2013).

²⁴ Notice 12-268, p. 55.

the CMA licenses that were employed in numerous previous auctions, including Auctions 73 (700 MHz), 78 (AWS-1), and 92 (Lower 700 MHz), and they “nest” within existing EAs. Licensing spectrum based on PEAs thus would entail some of the benefits of smaller geographic licenses, including promoting participation by a broader array of carriers, while employing geographic units that are capable of nesting into larger EAs.”²⁵

CCA itself still advocates the use of CMAs as the basis for geographical area licensing in the Forward Auction. Its proposal for PEAs is presented as a possible compromise that would allow somewhat greater opportunity for smaller bidders while limiting the increase in the number of licenses. A key aspect of the PEA approach is that it allows for a redefinition of economic areas, potentially trying to tie them more closely to actual demand from operators, but does so within the structure of existing EAs and CMAs. While many operators are likely to have issues with the definition of individual PEAs, and these may change after review by the FCC, the general approach may provide a practical framework for revisiting geographic area licensing within the proposed timeframe for implementing the Incentive Auction. This is an approach we explore further in this paper.

²⁵ CCA Ex Parte, p. 2.

Exhibit 1: Map of CMAs (MSAs and RSAs) and their relationship to EAs [Source: RWANTCA *Ex Parte*]

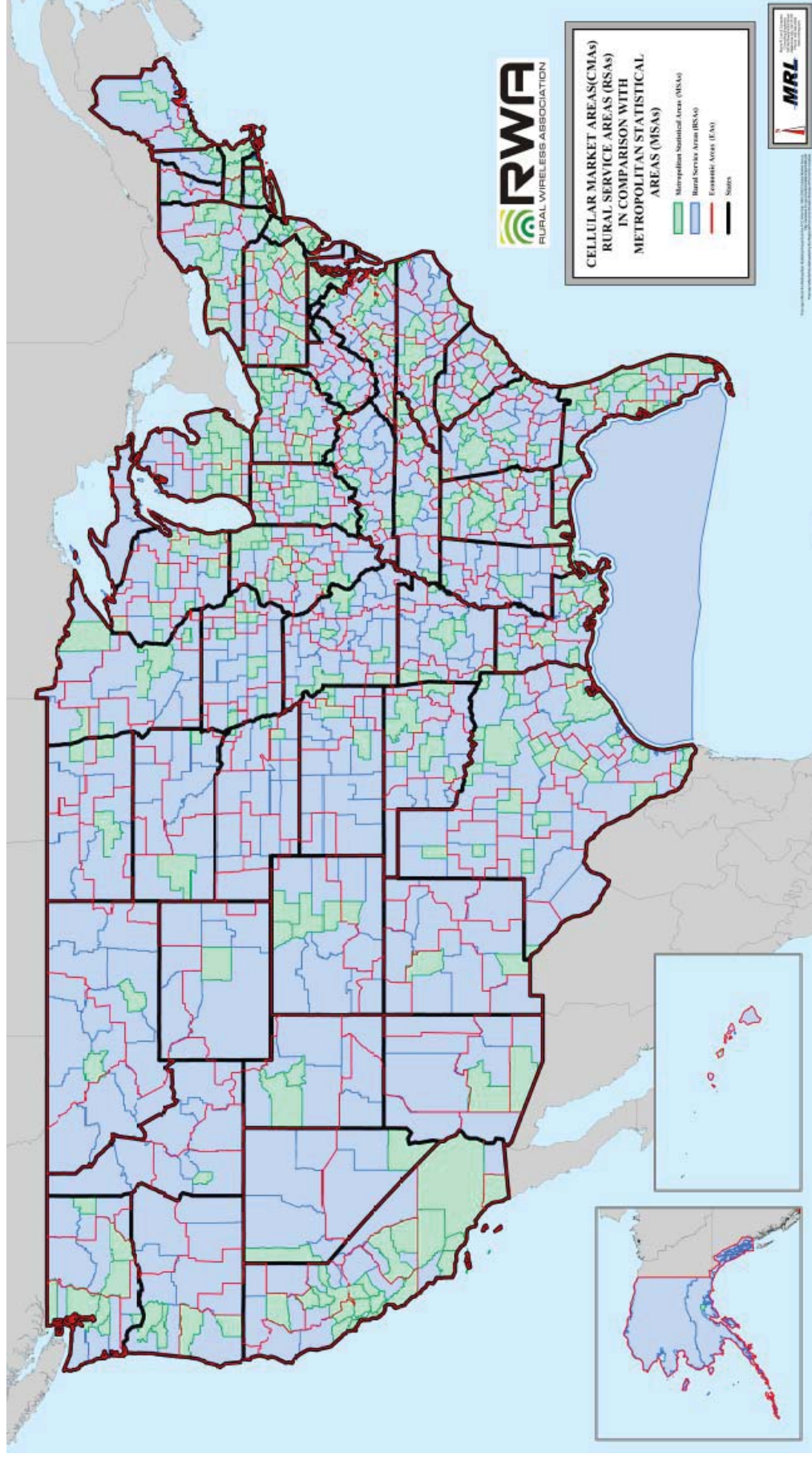
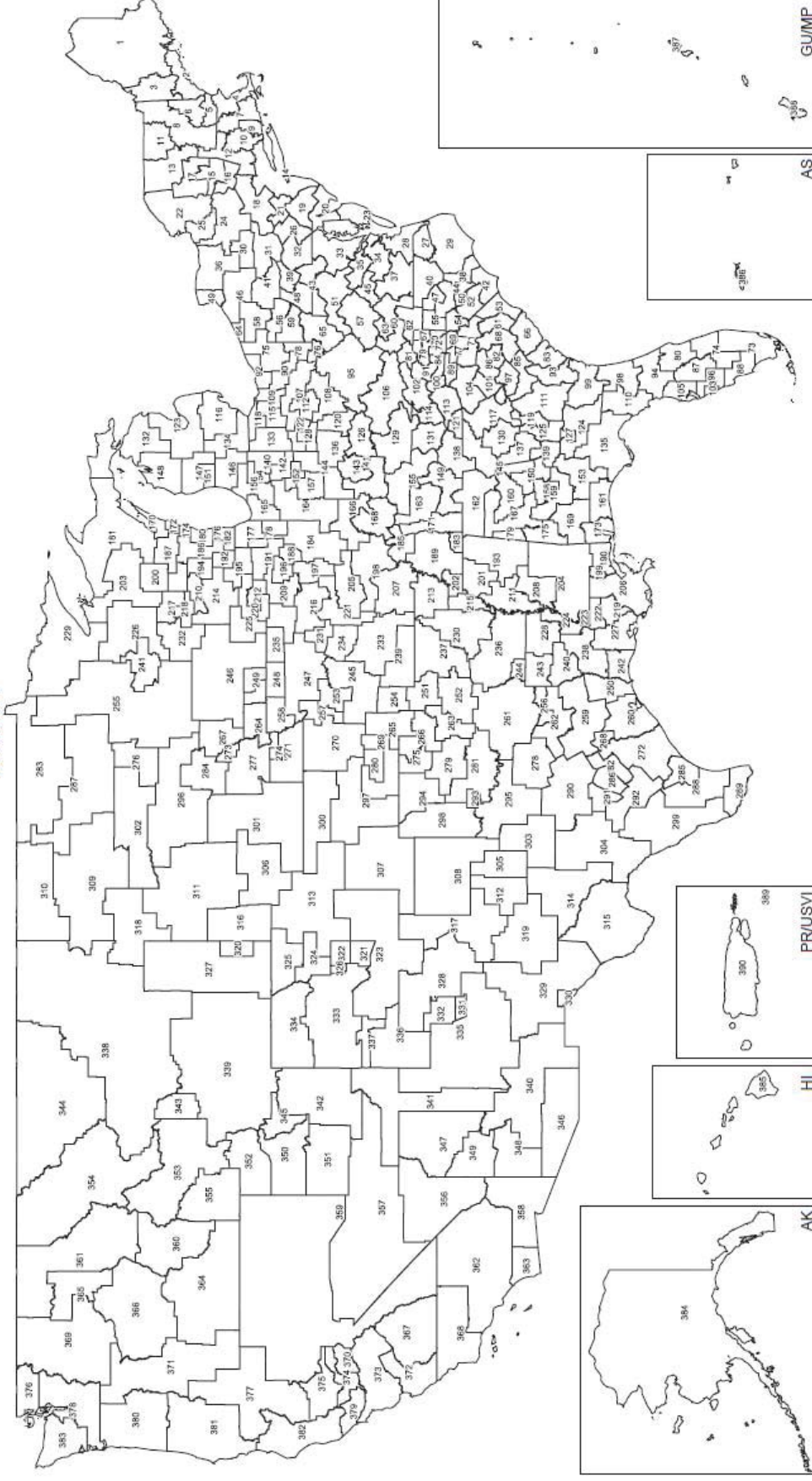


Exhibit 2: Map of CCA's updated proposal for PEA boundaries [Source: CCA *Ex Parte*]

Proposed PEA Boundaries 12/20/2013



III. A structure for evaluating the pros and cons of smaller and larger regions

In this section, we introduce a set of criteria that may be used to evaluate the pros and cons of smaller versus larger license areas. We conclude that there is a strong case for using smaller geographic license areas on both economic and public policy grounds, but observe that there are also downsides to expanding the number of licenses. As a contribution towards resolving this dilemma, we put forward our proposal for a two-phase auction approach.

A. Overview of the criteria

The FCC's request for comments on the level of geographic licensing has stimulated significant debate over the appropriate approach, with different commenters providing lists of arguments in favor of either smaller or larger area licensing. We highlight many of the arguments in the paragraphs below. In order to focus our discussion, we have attempted to distill these arguments into a limited number of key points which underpin the rival cases, and a separate list of criteria which the FCC may consider when evaluating the relative weight of competing arguments.

We believe that the case supporting smaller area licensing in the Forward Auction is primarily based on four points:

- Having smaller license areas promotes participation in the auction, because small bidders have the opportunity to bid on lots that match their geographic requirement;
- Smaller license areas also maximize the role of the market in determining allocation, as they ensure that all sources of demand may be represented and tested in the auction;
- Using small license areas may best fulfill the FCC's statutory obligations to promote economic opportunity for small businesses and rural areas, including its mandate under Section 309(j) of the Communications Act (the Act), as amended; and
- Smaller license areas would potentially support greater variation in the amount of reclaimed spectrum from area-to-area.

The case for larger area licenses is primarily based on three points:

- Larger license areas mitigate aggregation risk for national and large regional bidders, thus giving them greater security to express the full value of their demand;
- Having fewer licenses diminishes the scope for gaming activity in the auction, which might otherwise distort the process; and
- Having fewer licenses facilitates auction implementation by reducing complexity for the auctioneer and for bidders, making it possible to run the auction more quickly.

It is the role of the FCC to consider the trade-offs between these arguments. In doing so, the FCC is likely to focus on five key criteria which lie at the heart of its mandate for the Incentive Auction and its broader mandate to serve the American people:

- Economic efficiency;
- Promotion of sustainable downstream competition;
- Raising revenues;
- Successful implementation of a complex auction; and
- Public policy and statutory obligations in relation to smaller carriers and rural areas.

In the following sections, we undertake what we call Stage 1 and Stage 2 evaluations of the impact of using different geographic licensing for the Forward Auction. In Stages 1a and 1b, we consider respectively the strength of each point supporting smaller licenses and each point supporting larger licenses. In Stage 2, we proceed to compare each licensing approach on the basis of the five key criteria that will likely underpin the FCC's final decision.

Our analysis focuses primarily on the case for licensing at the EA level versus smaller area licensing, such as CMAs or PEAs. This reflects the primary division amongst stakeholders to date, between national operators, who broadly support the EA approach, and smaller carriers who want CMA licensing. We recognize, however, that one national bidder, T-Mobile, has called for larger area licenses²⁶ and another, AT&T, has supported EAs conditioned on there being some form of package bidding.²⁷ In this context, a key question for analysis is whether intermediate approaches, such as EAs and PEAs, really do strike an acceptable balance between other approaches, or fail to adequately capture the benefits of either smaller or larger licensing regimes.

B. Stage 1a evaluation: the case for smaller licenses

Here, we explore each of the four main arguments for smaller licenses in turn.

1. Promote participation

A number of respondents to the FCC have put forward the argument that licensing 600 MHz spectrum at the CMA level would promote participation in the Forward Auction.²⁸ They argue

²⁶ Comments of T-Mobile USA, Inc. GN Docket No. 12-268, pp. 15-17 (Jan. 25, 2013) ("T-Mobile Comments").

²⁷ Comments of AT&T Inc., GN Docket No. 12-268, pp. 54-58 (Jan. 25, 2013) ("AT&T Comments").

²⁸ See William Lehr and J. Armand Musey, "Right-sizing Spectrum Auction Licenses: The Case for Smaller Geographic License Areas in the TV Broadcast Incentive Auction," pp. 8-9 (Nov. 20, 2013) ("Summit Report") (adopting smaller sized licenses will increase auction participation); Letter from Gregory W. Whiteaker, Counsel for Sandhill Communications, Inc. to Marlene H. Dortch, Secretary, Federal Communications Commission, Docket No. 12-268 (Aug. 21, 2013) (licensing the

that EAs are too large and a poor fit with the footprints of smaller providers. With EA licensing, small providers may be deterred from participating, because they cannot realistically compete for licenses that cover large populations outside their territory. Further, small providers tend to have limited financial resources, so cannot afford to take the risk of buying a larger territory and then disaggregating it in the secondary market. Such respondents typically favor licensing at the CMA level, because this makes it much easier for smaller providers to match their geographic footprint.

The argument that large area licenses will reduce participation in the auction seems entirely plausible. The active participation of small carriers and their trade bodies in FCC consultations on the auction process is a clear sign of interest in the band. Further, it is possible to identify many individual carriers who would be adversely affected by a decision to use an EA licensing approach. For example, a report by the Summit Ridge Group, based on analysis of letters to the FCC, identifies 12 local carriers who say they will not participate in the auction if an EA structure is used exclusively for licensing 600 MHz spectrum. These companies are listed in Table 2.

Table 2: Carriers indicating to FCC they will not participate in an EA Auction²⁹

| Local carriers | |
|--|---|
| Atlantic Seawinds Communications, LLC | Chat Mobility |
| Appalachian Wireless (East Kentucky Network LLC) | Northwest Missouri Cellular Limited Partnership |
| Bluegrass Cellular | Plateau Telecommunications |
| Carolina West Wireless | Public Service Wireless Services, Inc. |
| Cellcom | Sandhill Communications |
| Cellular One (MTPCS, LLC) | Vtel Wireless |

Separately, we have analyzed the operating footprints of a limited number of local carriers as an illustration of the problems such operators would face if spectrum was auctioned exclusively on an EA basis. These examples are presented in Table 3. Our understanding, based on discussions

600 MHz spectrum on the basis of CMAs will increase auction participation and competition in the market); Letter from Gregory W. Whiteaker, Counsel for VTel Wireless, Inc. to Marlene H. Dortch, Secretary, Federal Communications Commission, Docket No. 12-268 (Aug. 21, 2013) (licensing the 600 MHz spectrum on the basis of CMAs will increase auction participation and foster innovation and competition); Letter from David A. LaFuria, Counsel for N.E. Colorado Cellular, Inc. d/b/a Viaero Wireless to Marlene H. Dortch, Secretary, Federal Communications Commission, Docket No. 12-268, p. 4 (Dec. 9, 2013) (right-sized licenses will increase auction participation); Comments of United States Cellular Corporation, Docket No. 12-268 at 12 (filed Jan. 25, 2013) (“CMAs would be the most effective means for the Commission to foster the prompt availability of competitive wireless broadband services to rural markets”); Comments of the Wireless Internet Service Providers Association, Docket No. 12-268, p. 31 (filed Jan. 25, 2013) (“by auctioning smaller areas, the Commission would invite more participation in the auction...”).

²⁹ Summit Report, p. 17.

with RWA and NTCA, and review of submissions from CCA, is that there are many more companies in similar positions. The implication of this analysis is that EA geographic areas are too large for the purposes of the auction, as there is abundant evidence that smaller areas can provide coherent economic market for mobile wireless services.

Table 3: Illustrative examples of bidding challenges for local operators

| |
|---|
| <p>Bluegrass Cellular</p> <p>Bluegrass Cellular (Bluegrass) currently provides service to an area with a population of around 2 million people in rural parts of Kentucky. In order to fully cover its current footprint, Bluegrass says it would need to win spectrum across four EAs, which cover a population of over 5 million people and include large population centers such as Lexington and Richmond in Kentucky, Nashville in Tennessee, and Evansville in Indiana. However, Bluegrass only serves two smaller cities within these EAs. Accordingly, the company does not believe it can compete with larger carriers in these regions, and contends that it “...<i>does not have the financial wherewithal to bid on four or five separate EAs encompassing five times the number of pops it currently serves.</i>”³⁰</p> |
| <p>Leaco Rural Telephone Cooperative, Inc.³¹</p> <p>Leaco Rural Telephone Cooperative, Inc. (Leaco) currently provides service to an area with a population of less than 1 million people in the Southwest, across three separate geographically contiguous areas including parts of Arizona, California, Colorado, New Mexico and Texas. In order to cover its current footprint in full, Leaco would need to win spectrum across seven Economic Areas, which have a reported population of 32 million people, including LA and Dallas. More plausibly, Leaco could achieve up to 50% coverage of its footprint (by population) by focusing on three smaller EAs (#129, #136 and #141), but these still cover over 4 million people, including a number of metropolitan areas that Leaco does not serve. Even in this reduced case, it seems questionable whether Leaco would be able to compete against a national carrier, given that it is only interested in serving a modest proportion of the available customer base.</p> |
| <p>NEP Wireless, Inc.³²</p> <p>NEP Wireless, Inc. (NEP) currently provides wireless service to a population over 300,000 in rural northeastern Pennsylvania and in rural New York. In order to cover its current footprint in full, NEP would have to bid on two EAs (#6 and #10), one of which includes New York City (#10). These two EAs cover a population over 28 million, and includes counties in Connecticut, Massachusetts, New Jersey, New York, Pennsylvania, and Vermont. NEP would be unable to compete for these licenses. NEP could cover 80% of its current footprint with the EA that does</p> |

³⁰ *Ex Parte* Letter from Bluegrass Cellular, to Marlene Dortch, Secretary, Federal Communications Commission, GN Docket No. 12-268 at 1 (July 10, 2013) (Bluegrass *Ex Parte*).

³¹ NERA analysis based on information provided to us by RWA.

³² NERA analysis based on information provided to us by RWA.

not include New York City. Unfortunately, that EA is a geographic area that covers 2 million people. It seems implausible that NEP could win this EA, which could undermine their business case for participating in the auction. Alternatively, NEP would only need to win two CMAs (#122 and #616) to cover over 95% of their current footprint. If the auction were to include licenses at the CMA level, NEP would be able to compete for all spectrum in their footprint.

Pinpoint Wireless, Inc.³³

Pinpoint Wireless, Inc. (Pinpoint) currently provides commercial wireless service to a handful of counties in rural southern Nebraska and Kansas to an area with a population under 40,000. If the Forward Auction were to include only spectrum licensed across EAs, Pinpoint would need to win four EAs covering a population over 6 million, spread across four states. It seems very unlikely that Pinpoint would be able to compete against national carriers. However, Pinpoint would only need to win two RSAs in order to cover its current footprint. If the auction were to include rural licenses at the CMA level, Pinpoint would be able to compete for spectrum covering its existing footprint.

Union Wireless³⁴

Union Wireless (Union) currently covers an area with a population of about 2 million people in Wyoming and adjacent states. To cover its current footprint, Union would have to bid on 10 EAs which together cover 10 million people, including three EAs with large metropolitan areas, most notably Denver. It seems implausible that Union could win these three lots if competing against national bidders. However, without them, Union would only be able to cover 40% of its footprint, which may in turn undermine its business case for bidding in other regions because Union's main interest is only in the rural areas (RSAs) that happen to be in the same EAs as the big metropolitan areas.

PEAs were first put forward by CCA as a potential compromise approach that may facilitate greater participation in the auction while limiting the growth in number of licenses. These license areas were subsequently revised.³⁵ The revised PEA boundaries, as illustrated in Exhibit 2, would clearly help some operators, but in other cases, concerns about license area size remain. For example:

- Pinpoint's prospects of being able to compete in the in the auction would not be improved by the switch to PEAs. Pinpoint would need to win four PEAs and still face an obligation to cover a population over 500,000 in four states. The population coverage of these four PEAs is 15x their current coverage. While the PEA approach is an

³³ NERA analysis based on information provided to us by RWA.

³⁴ NERA Analysis based on information provided to us by RWA.

³⁵ CCA Ex Parte 2.

improvement over the EA approach, it is still highly unlikely that Pinpoint could compete.

- NEP's prospects of being able to compete in the auction are slightly improved by the switch to PEAs. To cover its current footprint, NEP would have to bid on two PEAs that cover a population over 1.5 million. Alternatively, NEP could cover 80% of their current footprint by winning just one PEA which has a population of 700,000. While this is an improvement over the EA scenario, it still remains rather unlikely that NEP could compete in an auction at the PEA level.
- Leaco's prospects of participating in the auction would be improved by the switch to PEAs, but it would still face an obligation to bid for large swathes of territory that it does not cover, including several metropolitan areas. Leaco could cover its footprint by bidding on nine PEAs instead of seven EAs, but these PEAs still have an aggregate population of 2.5 million, more than twice Leaco's actual footprint.
- Union's ability to compete in the auction would also be improved by the shift to PEAs as presently proposed. Union could cover its footprint with 16 PEAs instead of 10 EAs, and the aggregate population of these regions is under 3 million, less than 1.5x its footprint. Still, Union would face bidding for some significant areas that they do not currently serve.

In principle, one way that smaller operators might adapt to larger license areas is to form consortia and divide up EAs that they win based on their footprints. However, this supposes that there are groups of smaller operators who have footprints that together will cover all or most of the population in multiple EAs. In practice, we suspect that this will rarely be the case, as smaller operators typically do not operate in the larger urban areas that typically account for large shares of population in many EAs. Even where footprints are a good match, coordination may still be a formidable challenge.

In contrast to local operators, there is no reason to suppose that large, national carriers would be deterred from participating in the auction if CMA level licensing was used. While large carriers have argued that they would be disadvantaged by small area licenses, and that competition amongst themselves may be distorted, none suggested that they would not participate in the auction over this issue.

In conclusion, there is clear evidence that using larger area licenses, such as EAs, would exclude potential participants from the Forward Auction. In each area where a small carrier is present and affected, this may mean at least one less competitor for the spectrum. The PEA approach, as currently defined, is a partial solution that may facilitate participation by some smaller operators but not others.

2. Maximizing the role of the market

A fundamental rationale for the use of auctions by the FCC is to allow the market to play a central role in determining spectrum allocation: *"The Commission has found that spectrum*

*auctions more effectively assign licenses than either comparative hearings or lotteries. The auction approach is intended to award the licenses to those who will use them most effectively.*³⁶ In determining the appropriate level of geographic licensing, a key point of analysis for the FCC should be the extent to which this decision may constrain the market from testing the full range of plausible auction outcomes.

For the purposes of our paper, we assume that CMAs represent an acceptable lowest common denominator unit, from which demands for all potential bidders may be reasonably satisfied. Put differently, we assume that licensing at the CMA level would not constrain the set of potential outcomes from the auction. We note, however, that one respondent has suggested that the FCC could consider licensing the 600 MHz spectrum on a county level.³⁷

It follows directly from our finding that EA licensing will eliminate some potential participants from the auction, that it will also constrain the set of potential outcomes from the auction. Put differently, use of EAs means the range of allocation scenarios that the market is allowed to explore will be truncated.

In proposing not to sell the spectrum at the CMA level, the FCC is making a call that it is not necessary to test the full range of market outcomes. This could be because:

- It thinks that small operators who want to participate at the CMA level would not win any spectrum, so the efficiency of the outcome is unaffected;
- It believes that excluded bidders could buy the spectrum they need after the auction in the secondary market; and/or
- There are arguments in favor of larger area licensing that outweigh concerns about efficiency related to small bidders.

Based on the information provided in the Notice,³⁸ it appears the FCC's initial preference for EA-area licenses is based primarily on the third point. The FCC does not offer any opinion on the business cases of potential participants, nor comment on the secondary market in this regard.

The FCC permits trading and disaggregation of licenses for secondary markets, subject to respecting competition rules. At least one larger operator, T-Mobile, has argued that the secondary market is an effective alternative to small area licensing: *"because the Commission will likely impose meaningful performance requirements for the spectrum, spectrum partitioning,*

³⁶ See "About Auctions," FCC, available at: http://wireless.fcc.gov/auctions/default.htm?job=about_auctions.

³⁷ See Comments of Competitive Carriers Association, Docket No. 12-268, p. 15 (filed Jan. 25, 2013) (the FCC could consider designing the auction around Designated Market Areas and further disaggregate DMAs into county blocks to allow more granular bidding); see also Reply Comments of the Competitive Carriers Association, Docket No. 12-268, p. 12 (filed March 12, 2013).

³⁸ Notice 12-268, pp. 54-56.

disaggregation, and leasing should remain viable options for parties interested in smaller geographic area licenses."³⁹ However, while it is possible that inefficiencies in primary allocation may be corrected in the secondary market, there is no guarantee this will happen. In particular, trades between large and small operators may be frustrated by high transaction costs or by inertia. For example, larger operators may give very low priority to disaggregating small area licenses, given their small value as a proportion of overall holdings.

It is beyond the scope of this paper to explore the effectiveness of the U.S. secondary market for spectrum. However, the fact that the trade bodies representing smaller operators, CCA, NTCA and RWA, all argue for licensing at the CMA level suggests that small operators believe that they have better prospects of securing 600 MHz spectrum in the auction than in the secondary market. While there are many examples of larger operators acquiring spectrum from smaller players over the last five years,⁴⁰ we understand that there is little recent history of the larger

³⁹ T-Mobile Comments, p. 17.

⁴⁰ See, e.g., *In the Matter of AT&T, Inc., Leap Wireless International, Inc., Cricket License Company, LLC, and Leap Licenseco, Inc. Seek Consent to the Transfer of Control of AWS-1 Licenses, PCS Licenses, and Common Carrier Fixed Point to Point Microwave Licenses, and International 214 Authorizations, and the Assignment of One 700 MHz License*, Comments of the Rural Wireless Association, Inc., WT Docket No. 13-193 (filed September 27, 2013); *In the Matter of Applications of Softbank Corp., Starburst II, Inc., Sprint Nextel Corporation, and Clearwire Corporation for Consent to Transfer Control of Licenses and Authorizations, and Petitions for Reconsideration of Applications of Clearwire Corporation for Pro Forma Transfer of Control*, IB Docket No. 12-343 and ULS File Nos. 0005480932, et. al., (Order Released July 5, 2013); *In the Matter of AT&T, Inc., Celco Partnership d/b/a Verizon Wireless, Grain Spectrum, LLC, and Grain Spectrum II, LLC Seek FCC Consent to the Assignment of Advanced Wireless Services and Lower 700 MHz Band B Block Licenses and to Long Term De Facto Transfer Spectrum Leasing Arrangements Involving Advanced Wireless Services and Lower 700 MHz Band B Block Licenses*, Comments of the Rural Telecommunications Group, Inc., WT Docket No. 13-56 (filed April 4, 2013); *In the Matter of AT&T Inc. and Atlantic Tele-Network, Inc. Seek FCC Consent to the Transfer of Control and Assignment of Licenses, Spectrum Leasing Authorizations and an International Section 214 Authorization*, Comments of the Rural Telecommunications Group, Inc., WT Docket No. 13-54 (filed April 4, 2013); *In the Matter of Applications of Deutsche Telekom AG, T-Mobile USA, Inc., and MetroPCS Communications, Inc. for Consent to Transfer of Control of Licenses and Authorization*, WT Docket No. 12-301 (Order Released March 12, 2013); *In the Matter of AT&T, Inc. and Cellular South, Inc. Seek FCC Consent to the Assignment of Cellular, Personal Communications Services, Lower 700 MHz C Block, and Microwave Licenses Covering Parts of Alabama, Georgia and Tennessee*, Comments of the Rural Telecommunications Group, Inc., ULS File Nos. 0005597386, et. al. (filed March 8, 2013); *In re Applications of Celco Partnership d/b/a Verizon Wireless and T-Mobile License, LLC Seek FCC Consent to the Assignment of Advanced Wireless Service Licenses*, Petition to Deny, WT Docket No. 12-175 (filed July 10, 2012); *In re Applications of Celco Partnership d/b/a Verizon Wireless and Leap Wireless International, Inc. Seek FCC Consent to the Exchange of Lower 700 MHz Band A Block, AWS-1, and Personal Communications Service Licenses*, Petition to Deny of the Rural Telecommunications Group, Inc., ULS File Nos. 0004942973 et. al. (filed February 21, 2012); *In re Applications of SpectrumCo, LLC, Transferor and Cox TMI Wireless, LLC, Transferor, and Celco Partnership d/b/a Verizon Wireless, Transferee, for Consent to the Assignment of AWS-1 Licenses*, Petition to Deny of the Rural Telecommunications Group, Inc., WT Docket No. 12-4 (filed February 21, 2012); *In re the Applications of Deutsche Telekom AG, Transferor, and AT&T, Inc., Transferee, for Consent to Assign or Transfer Control of Licenses and Authorizations*, Petition to Deny, WT Docket No. 11-65 (filed May 31, 2011); *In the Matter of Applications of AT&T Inc. and Celco Partnership d/b/a Verizon Wireless for Consent to Assign or Transfer Control of Licenses and Authorizations and Modify a Spectrum Leasing Arrangement*, Petition to Deny of the Rural Telecommunications Group, Inc., WT Docket No. 09-104 (filed July 20, 2009); *In the Matter of Applications of Celco Partnership d/b/a Verizon Wireless and Atlantis Holdings LLC for Consent to Transfer Control of Licenses, Authorization, and Spectrum Manager and De Facto Transfer Leasing Arrangements*, Petition to Deny of the Rural Telecommunications Group, Inc., WT Docket No. 08-95 (filed August 11, 2008).

carriers leasing, disaggregating or partitioning large sections of spectrum where they already have service.

As a more general point, given the mandate from Congress for the FCC to raise revenues from the auction, it would not make sense for the FCC to rely on the secondary market to address inefficiencies caused by geographic licensing if they could instead be addressed in the primary design. If disaggregated spectrum was sold shortly after the auction, this might imply that the auction design had “left money on the table.”

In conclusion, making licenses available only at the EA level will significantly constrain the set of geographic licensing outcomes that could result from the Forward Auction. As we discuss below, this may mean that the outcome of the Forward Auction is less efficient than it could be if smaller area licensing was used. Although inefficient outcomes may be corrected in the secondary market, it would be preferable to avoid such inefficiency in the primary process, given that inefficiency implies lower revenues from the Forward Auction, and trading may be constrained by transaction costs and inertia.

3. Support for rural areas

Within its mandate, the FCC has certain obligations to promote the provision of telecommunications services in rural areas and support small businesses and rural carriers. Specifically, under Section 309(j) of the Act, Congress mandates the Commission, when designing systems of competitive bidding, to:

“promot[e] economic opportunity and competition and ensur[e] that new and innovative technologies are readily accessible to the American people by avoiding excessive concentration of licenses and by disseminating licenses among a wide variety of applicants, including small businesses [and] rural telephone companies...”⁴¹

and to:

“prescribe area designations and bandwidth assignments that promote (i) an equitable distribution of licenses and services among geographic areas, and (ii) economic opportunity for a wide variety of applicants, including small businesses [and] rural telephone companies...”⁴²

In a joint submission to the FCC, RWA and NTCA made the case that these obligations under law would be best met by making spectrum available at the CMA level.⁴³ In particular, they

⁴¹ 47 U.S.C. § 309(j)(3)(B).

⁴² 47 U.S.C. § 309(j)(4)(C).

⁴³ *Ex Parte* Presentation from Rural Wireless Association, and NTCA – The Rural Broadband Association to Marlene Dortch, Secretary, Federal Communications Commission, GN Docket No. 12-268 (Dec. 6, 2013) (“RWA/NTCA Ex Parte”), p. 3.

stressed the importance of making spectrum available at the RSA level as a way of ensuring service to rural areas. They argued that:

*“bifurcating the auction of metropolitan and rural areas gives small and rural providers meaningful opportunity to participate in the Incentive Auction and helps the Commission ensure the broad dissemination of licenses among a variety of carriers in accordance with Section 309(j)”*⁴⁴

and that:

*“This spectrum is particularly well suited for use in rural area and will provide vital reliable and robust broadband wireless services that support unserved and underserved areas in rural America. ... Uses for the spectrum will likely include private in-home use, broadband access for schools and libraries, as well as broadband access by commercial operations such as mining, oil exploration and production, smart farming, and machine-to-machine operations in rural and remote areas.”*⁴⁵

The Summit Ridge Group made the same point in its report submitted to the FCC by CCA. It points out that geographic license risk is a critical factor in promoting participation by rural operators. It argues that, *“The relevant risk is that the FCC might adopt license territories that prove too large for smaller rural or regional operators to bid for or use efficiently.”*⁴⁶

It is obvious from our previous analysis that an auction in which spectrum is sold only at the EA level will restrict opportunities for local operators to participate in the auction, and will deny them economic opportunity. This does not mean that the FCC is necessarily obligated to award licenses at a CMA level, as under the Act it must also take into account the *“public interest, convenience, and necessity”* and *“the characteristics of the proposed service.”*⁴⁷ However, given the statutory obligations of Section 309(j), it does put the onus on the FCC or other parties to provide countervailing evidence as to why larger areas, such as EAs, should be used in light of the arguments by smaller rural carriers that they will not be able to participate in the auction if EAs are adopted. Given recent precedent for licensing similar spectrum at the CMA level – for example certain licenses at 700 MHz spectrum – one might suppose this evidence would have to demonstrate that there is something different about the spectrum being made available in this award.

In conclusion, the FCC is under certain legal obligations to consider the interests of rural areas in determining the appropriate level of geographic area licensing. Licensing spectrum at the EA rather than CMA level would unavoidably restrict economic opportunities for local operators.

⁴⁴ RWA/NTCA Ex Parte p. 3.

⁴⁵ RWA/NTCA Ex Parte, p. 4.

⁴⁶ Summit Report, pp. 8-9.

⁴⁷ 47 U.S.C. § 309(j)(7)(A).

This would appear to imply the FCC should use smaller areas unless it can demonstrate that another approach is preferable, based on the public interest, convenience and necessity. The fact that only larger operators have supported licensing spectrum using geographic areas at the EA level (or larger) is an indication that the current FCC proposals are likely failing this criterion.

4. Deployment of reclaimed spectrum

One of the many challenges in designing the Incentive Auction is the mismatch between the service areas of incumbent broadcasters and those, such as EAs and CMAs, used for licensing spectrum to wireless operators. A further problem is the constraints of coordinating with Mexican and Canadian broadcasters using 600 MHz spectrum adjacent to the U.S. border. According to the FCC, *“the use of small geographic license areas, such as MSAs/RSAs, could potentially support much greater variation in the amount of reclaimed spectrum from area to area, but impose different tradeoffs.”*⁴⁸ The Summit Ridge Group makes the same point in its report, arguing that CMAs would *“increase the ability to allow for market variation in areas where limited amounts of spectrum are procured in the Reverse Auction, while reducing the amount of spectrum lost to international border coordination.”*⁴⁹

A more granular approach would likely mean that the FCC could license more spectrum not encumbered by potential interference from broadcasters. This appears to be an unambiguous benefit from moving from EAs to CMAs. However, we note that the FCC is concerned with whether the benefits of adopting CMAs are sufficient to outweigh other potential issues that may arise from the adoption of smaller license areas, such as the complexity of auction implementation.⁵⁰

C. Stage 1b evaluation: the case for larger licenses

Here we explore each of the three main arguments for larger licenses.

1. Aggregation risk

In any auction where spectrum is divided into geographic areas, bidders may face aggregation risk if their business case is dependent upon or enhanced by acquiring licenses in multiple regions. Having fewer geographic regions may reduce aggregation risk for bidders. For example, in principle, moving from CMAs to EAs would reduce aggregation risk for a bidder that has synergies between CMAs that nest within an EA. Similarly, moving from EAs to REAGs would reduce aggregation risk for a bidder that has synergies between EAs that nest within a REAG.

⁴⁸ Notice 12-268, p. 55.

⁴⁹ Summit Report, p. 2.

⁵⁰ Notice 12-268, para. 147.

It is helpful to distinguish between a number of different aspects of aggregation risk that could exist in the context of the Forward Auction:

- *Critical mass population coverage.* To justify the investment in a new spectrum band, including deployment of new cell sites, procurement of network equipment, and promotion of new handsets to customers, each operator is likely to seek spectrum that covers a critical mass of its target population. For a local operator, this might mean licenses covering all or most of its existing market. For a national operator, this might mean spectrum in a critical mass of key metro areas and/or travel corridors between them.
- *Geographic exposure problem.* Valuations for spectrum in some regions may be contingent on winning spectrum in others. For example, the value placed by an operator on acquiring a rural region may depend on whether it acquires a neighboring metro region. This means that bidders are potentially exposed to winning unwanted or unprofitable subsets of their demand if they are outbid on key regions.
- *Critical mass of spectrum.* Within each license area, operators may target a minimum quantity of spectrum to support provision of high bandwidth services. For example, an operator may place a much higher value on securing 2x10 MHz than 2x5 MHz, because a larger contiguous spectrum block can support higher speeds.

In this discussion, we focus on the first two types of aggregation risk, as they are affected by geographic area licensing. In the responses submitted to date, AT&T, T-Mobile and Verizon have all been prominent in raising concerns about aggregation risk. For example:

- AT&T contends that “...the forward auctions in a few cities might conclude early and leave the carrier as a high bidder, while the bidding proceeds to such high levels in other cities that the carrier can no longer afford to remain in those auctions.”⁵¹ AT&T argues that if the FCC adopts CMA license areas, its aggregation risk would increase, as: “...bidders might exit the forward auction early to avoid the classic exposure risk of ‘winning’ a hodgepodge of scattered spectrum assets that lack much of the value they would have presented had they been part of a seamless geographic package. That exposure risk would thus suppress forward-auction participation and increase risk of auction failure.”⁵²
- Verizon believes that aggregation risk may “inhibit participation in the auction, because, for some bidders, the potential for acquisition of all desired licenses is needed to support the amount of a bid for multiple licenses.”⁵³

⁵¹ AT&T Ex Parte, p. 2.

⁵² AT&T Comments, p. 7.

⁵³ Comments of Verizon and Verizon Wireless, GN Docket No. 12-268, at 49 (Jan. 25, 2013) (“Verizon Comments”).

- T-Mobile argues that “*exposure risk creates a fundamental problem for companies such as T-Mobile*” and that “*T-Mobile might have to spend billions of dollars before learning that the total price for the bundle of licenses T-Mobile wants ‘makes the whole entry unaffordable or unprofitable,’*” and suggests shifting to MEAs as a way of reducing the exposure problem.⁵⁴

We note that shifting from EAs to either smaller CMAs or larger MEAs may make little difference to the ability of a larger bidder to secure a critical mass of population coverage. For example, at the MEA level, one operator could achieve population coverage of 100 million by winning just 7 out of 52 licenses. Although the number of available licenses more than triples at the EA level, the minimum number of licenses needed to cover 100 million people only increases from 7 to 9. Furthermore, at the CMA level, population coverage of 100 million can be achieved with just 20 licenses out of a total of over 700. The modest increase in the number of licenses required reflects the fact that U.S. population is heavily concentrated in major metropolitan areas.

Shifting from EA to PEA or CMA licensing may, however, substantially increase geographic exposure risk for national bidders. In a single auction, with CMA licenses, a national bidder may be obligated to submit bids on many small regions, where competition may be limited, without knowing whether it will win a critical mass of larger population centers. Such exposure risk may also apply to local area bidders, seeking a modest number of adjacent geographic regions. In the worst case, such bidders may decide not to bid at all for regions less important to their business case, for fear of winning them without associated metro areas. On the other hand, exposure risk may be partially mitigated by the option to sell licenses after the auction.

Using larger area licenses is not the only approach available to addressing aggregation risk. Other approaches include: the use of staged activity rules and withdrawal rights; sequencing of the award, with smaller, less valuable regions sold after competition for major regions has been resolved; and/or introduction of package bidding. In this paper, we explore two of these options: sequencing and package bidding. We do not explore the scope for staged activity rules or withdrawal rights, as these rules were designed for the SMRA format previously used by the FCC, and appear problematic in the context of a clock auction format.

In conclusion, a shift from EA licensing to PEA or CMA licensing may increase aggregation risk for some bidders. The primary concern here is that bidders, large or small, may be exposed to winning an unwanted subset of their demand. This is a risk that the FCC must always balance against the benefits of bidders having greater flexibility with smaller license areas to express the granularity of their demand. Such risk may also be mitigated through other measures, such as sequencing or package bidding. For national bidders, risks related to winning a critical mass of population coverage are already present with EA licensing and are probably not greatly increased by a shift to smaller geographic areas.

⁵⁴ Reply Comments of T-Mobile USA, Inc. GN Docket No. 12-268 at 58 (Mar. 12, 2013) (“T-Mobile Reply Comments”).

2. Gaming behavior

Gaming in the context of a spectrum auction refers to bidding behavior that deviates from straightforward valuation-based bidding for the purposes of trying to mitigate risk or gain a price or allocation advantage relative to competitors. Many past FCC auctions using the SMRA format have featured gaming behavior by bidders. Some examples are documented in academic papers.⁵⁵ To the extent that opportunities for gaming are linked to the number or type of geographic licenses, there could be concern that increasing the number of licenses will increase gaming options.

Notable gaming strategies include:

- *Parking.* Bidding on license areas that are competitive but are not targets, so as to preserve eligibility to return to target regions later. This strategy may be effective in delaying price increases in target regions.
- *Signaling.* Using lot selection or bid amounts to send signals to other bidders, for example in an attempt to coordinate demand reduction.
- *Exposure strategies.* Deliberately driving up the price of certain lots relative to others to exploit known aggregation risk and budget constraints amongst rival bidders.

The scope for such behavior in the Incentive Auction will clearly be affected by the shift from an SMRA to a clock format, and the proposal to use anonymous bidding. In particular, the scope for signaling will be significantly reduced because bidders cannot bid on individual lots nor easily identify themselves to rivals.

While the precise scope for gaming in the Incentive Auction is uncertain, the more material question in this regard is whether a shift from EAs to PEAs or CMAs would plausibly increase any such opportunities. Considering first a shift from REAGs or MEAs to EAs, it is apparent that such an increase in the number of licenses would give bidders greater flexibility to shift demand across regions, which may create more opportunities for strategies like parking or signaling, especially across urban areas. It would also likely increase the number of bidders in the auction who can do this (because having smaller licenses will likely increase participation). A shift from EAs to PEAs or CMAs would presumably increase such opportunities, but the incremental impact is likely more modest, given that this latter change does not significantly expand the number of major urban regions.

In conclusion, we have not identified any reason to believe that opportunities for gaming would be significantly affected by a shift from EA to PEA or CMA licensing. Such behavior is likely to be a function of other aspects of the auction design.

⁵⁵ See, e.g., Peter Cramton, Spectrum Auctions, February 2001, in *Handbook of Telecommunications Economics*, Martin Cave, Sumit Majumdar, and Ingo Vogelsang, eds., Amsterdam: Elsevier Science B.V., Chapter 14, 605-639, 2002.

3. Auction complexity

Concerns about the impact of the number of licenses on auction complexity, both for itself as auctioneer and for bidders, appears to be the primary factor underpinning the FCC's preliminary preference for using EAs. In the Notice, the FCC states that *"having a large number of very small licenses may raise implementation risks for the auction designs contemplated in this proceeding,"* and that *"EA licensing strikes an appropriate balance between geographic granularity from a spectrum reclamation standpoint and having a manageable number of licenses from an auction design standpoint."*⁵⁶

In its discussion on geographic license areas in the Notice, the FCC does not elaborate on how exactly having more licenses will raise implementation risks. Also, this point has not as yet received much attention from stakeholders. Verizon, for example, raised concerns about auction complexity with small geographic license areas, and noted that *"the administrative challenges associated with managing a Forward Auction and subsequent assignment process for 734 individual CMA-based generic licenses, and interjected even more geographical complexity into the repacking formula, would be very high and could extend the duration and complexity of the auction – contrary to the interests of Reverse Auction bidders as well"*⁵⁷ but did not provide detailed analysis of how this would affect the auction. Therefore, we have attempted to identify a list of possible implementation concerns in the context of the FCC's preferred ascending clock format for the Forward Auction.

As a mechanism for selling large numbers of licenses, clock auctions are often preferred to SMRAs because they reduce the number of prices. In each round, with a clock auction, only one maximum price per category is required instead of one price per lot. An implication is that the clock format proposed for the Forward Auction may be considered very adaptable with respect to accommodating more geographic area categories, more so than historic SMRA formats.

Nevertheless, for the specific requirements of the Incentive Auction, we have identified four ways in which having more licenses may increase implementation risk:

- *Clearing rule.* The FCC's intention is to clear a consistent bandplan across all or most of the nation, but some exceptions are likely, either because an insufficient number of broadcasters choose to relinquish spectrum in some areas, or because there are coordination constraints at borders with Canada and Mexico. Increasing the number of regions may make it possible to clear more areas, but may also add to the complexity of the algorithm needed to solve the repacking problem in the Reverse Auction.
- *Inter-round bidding.* The FCC's Auction Advisors envisage that bidders be able to specify changes in demand at intermediate price points between round prices to minimize

⁵⁶ Notice 12-268, p. 55.

⁵⁷ Verizon Comments, p. 62.

the risk of demand overshoot. However, it means that for each category in each round, even though there is only one maximum price point, bidders face decisions in relation to many intermediate price points. As bidders approach marginal values for lots in each region, decisions may become quite complicated. From an implementation perspective, this may raise concerns about the ability of bidders to manage the process if they are active in a large quantity of regions, especially if they have synergies across those regions.

- *Simultaneous timing of Forward and Reverse Auctions.* The challenges for large bidders of managing inter-round bidding could be eased by using smaller bid increments (thus reducing the range of intermediate price points) and having longer bidding rounds. However, the downside of such measures is that they would slow the progress of the Forward Auction, and this in turn may constrain the pace of the Reverse Auction, given the proposal to run these simultaneously.
- *Package bidding.* The FCC does not currently envisage any substantial role for package bidding in the auction. However, this issue is under review. Increases in the number of licenses may have implications for whether and how package bidding could be introduced. We explore this issue further in Section VI.

None of these concerns appear insurmountable. As a general point, the FCC and its advisors are already proposing that the auction design be able to cope with 176 regions, which is a substantial number. Therefore, one would expect that such a design could be extended to cope with many more regions and there is no absolute maximum on the number of licenses that could be sold using the FCC design for the Forward Auction. With respect to bidding in the Forward Auction, we note that the burden of complexity falls primarily on national bidders, who are the same companies best able to invest time and effort in preparing for the auction. Further, innovations in the auction software and bidding process may be used to help such bidders make effective decisions within a reasonable bidding window.

D. Stage 2 evaluation – what is best for the United States?

Here we contrast the cases for smaller and larger area licenses in the context of the criteria that likely matter most to the FCC.

1. Economic efficiency

A core objective for any spectrum regulator is to promote the efficient use of radio frequencies. By efficient use, we mean ensuring that each block of radio spectrum is used to provide the most valuable service by the most effective operator, thereby maximizing long-term contributions to the welfare of U.S. citizens. Absent concerns about market failure and public value, this goal may be fulfilled by assigning spectrum to the user with the highest willingness to pay, typically through an auction mechanism.

Improving the efficiency of spectrum use is a central goal underpinning the entire rationale for implementing the Incentive Auction. For example, in the introduction to Notice 12-268, it is observed that:

*“The FCC has worked to free up spectrum for wireless broadband use, removed regulatory and other barriers to the use of spectrum, and enabled **more efficient use of spectrum** in numerous innovative ways.”⁵⁸ [emphasis added]*

We therefore consider the strength of the arguments for and against using smaller area licenses in terms of their potential impact on the efficient use of spectrum.

Moving to smaller license areas, such as CMAs, could facilitate economic efficiency in two ways. Firstly, it would facilitate participation of smaller and rural carriers in the Forward Auction, thereby allowing the market to test a broader range of auction outcomes; this, in turn, increases the likelihood that the final outcome is efficient. To the extent that such outcomes could not be swiftly realized through secondary market transactions after the auction, this is a clear benefit. Secondly, smaller license areas would potentially support greater variation in the amount of reclaimed spectrum from area-to-area.

On the other hand, using smaller licenses could also have some negative implications for efficiency. Firstly, bidders – especially national ones – may face increased aggregation risk. To the extent that this leads to bidders overpaying for spectrum or buying unwanted spectrum, it may weaken the efficiency of the auction. Secondly, increasing the number of licenses may complicate implementation, both for the FCC and for participating bidders, especially larger ones, which could affect efficiency if it leads to bidder error or discourages full participation.

On balance, the economic efficiency arguments for having licenses in the Forward Auction at a CMA or PEA level looks stronger than the arguments for having them at the EA level. The argument that EA-level licensing will constrain participation by local carriers is compelling. Further, the fact that many small carriers are active in lobbying for local area licenses implies that they think they do have a potential winning business case at that level, and that they do not have complete faith in the secondary market as an alternative assignment mechanism. Further, it is apparent that concerns about aggregation risk, gaming and auction implementation already exist with licensing at the EA level, and the impact on such risks of further increasing license numbers may be rather less than the impact of the decision to use at least EA level licenses.

How much does this matter? At a national level, the positive impact on efficiency of moving to smaller area licensing is probably modest. Based on an analysis of previous auctions in which CMAs were sold, we estimate that 65-70% of total value was associated with the 25 largest metro regions.⁵⁹ As small local operators are largely focused on regions other than the major metropolitan areas, their value impact is focused on the remaining 30-35%. However, at the state or local level, the impact on efficiency could be very substantial, as using smaller areas may facilitate different winning bidders with roll-out plans that prioritize rural areas rather than major metropolitan areas.

⁵⁸ Notice 12-268, p. 2.

⁵⁹ Based on data from Auctions #66 (AWS1) and #73 (700 MHz).

In conclusion, there is a strong case on efficiency grounds for the FCC to consider smaller areas licensing for the Forward Auction. While the impact on efficiency at the national level may be modest, the localized impact could be substantial.

2. Promotion of sustainable downstream competition

The FCC also has a mandate to promote sustainable competition in downstream mobile wireless services:

“Promoting competition is a fundamental goal of the Commission’s policymaking. Competition has played and must continue to play an essential role in the mobile wireless industry – leading to lower prices and higher quality for American consumers, and producing innovation and investment in wireless networks, devices, and services.”⁶⁰

Radio spectrum auctions provide an important opportunity to influence competition in mobile services, facilitating both expansion by existing operators and potential new entry. In this respect, the 600 MHz Forward Auction may be particularly important, as there is a potentially large amount of spectrum available and this is low frequency spectrum, which is particularly valuable for cost-effective wide-area coverage and in-building penetration.

When analyzing competition, as it does each year in its report to Congress on the state of competition in the mobile services marketplace, the FCC looks both at competition at the national level and in local areas. Although the FCC draws no conclusions on whether competition is effective, it does observe that choice of providers is typically weakest in less populated areas of the country:

“HHI values tend to vary with the population density of different markets. Specifically, market concentration in EAs tends to increase as the EA population declines... [FCC analysis] indicates that the most concentrated EAs tend to be in rural areas, while major metropolitan areas lie within the least concentrated EAs.”⁶¹

Using smaller area licensing is most likely to have a positive impact on competition in less populated areas. Facilitating the participation of local operators is more likely to produce outcomes in which there are multiple providers who will roll-out services in rural areas. This is because it will facilitate participation of operators whose business case is focused on under-served regions. Local operators that acquire 600 MHz spectrum may also be more effective competitors in their local areas against those national operators that do acquire and roll-out services in the same footprint.

⁶⁰ Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, Sixteenth Report, WT Docket No. 11-186 at 259 (2013) (“Sixteenth Report”).

⁶¹ See Sixteenth Report, p. 59 (stating “The Herfindahl-Hirschman Index (HHI) employed by the Commission to measure market concentration is the most widely-accepted measure of concentration in competition analysis”).

It is much less obvious how increasing the number of licenses beyond the 176 EAs could negatively affect competition at the national level, given that the increase is primarily focused on lower population areas.

In conclusion, the likelihood of having deployment and competitive carriers in under-served rural areas is greater if there are individual licenses covering these areas. By contrast, it is not immediately obvious that there is any downside for national competition.

3. Raising revenue

In relation to this award, the FCC has a specific mandate to raise revenues, so as to compensate broadcasters for vacating spectrum that is ceded to mobile wireless and “*support the first nationwide, interoperable, wireless broadband public safety network.*”⁶² It is therefore important to consider the impact of increasing the number of local and regional spectrum licenses on overall revenues.

A number of stakeholders have argued that using smaller area licensing will increase auction revenues, including Bluegrass Cellular, Carolina West Wireless and CCA. For example, Summit Ridge Group highlight a report by Dr. Scott Wallsten that analyzed data from “*69,000 spectrum sales including those from every FCC spectrum auction since 1996,*” and concludes that there is a “*clear negative correlation between the size of the region specified by the license and the revealed private value of the license.*”⁶³ It also points to the outcome of the 700 MHz auction (FCC Auction #73), where B block licenses allocated at the CMA level sold for \$2.68 per MHz-Pop, compared to only \$1.16 for A block licenses sold at the EA level and \$0.76 for C block licenses sold at the REAG level.⁶⁴ Of course, it is difficult to determine to what extent these differences result from bidders being able to follow a more targeted valuation based strategy at the CMA level, versus other effects, such as block preferences and the difficulties of switching from smaller to larger regions within the 700 MHz auction.

The counter argument is that using smaller area licenses may lead to larger bidders not bidding for some areas that they would otherwise have won as part of an EA license. If this happens solely because a larger bidder has no business case for rolling out in a particular locality, then this will not have a negative impact on revenues, as the large bidder will simply concentrate its money on the localities (*i.e.*, the areas with the highest densities of customers) that it likely most wanted from the start. However, it could hurt revenues if larger bidders are deterred from bidding for smaller areas owing to aggregation risk. We note that past auctions have used activity rules such as staged activity requirements and withdrawals, which ease exposure risk, but that such measures are not compatible with the design of the Incentive Auction, so in principle this problem could be worse than before. On the other hand, as previously noted, aggregation risk for

⁶² Notice 12-268, p. 199.

⁶³ Summit Report, p. 24.

⁶⁴ Summit Report, p. 25.

national bidders is already prevalent at the EA level, and it is unclear how much further it is increased by moving to smaller areas licenses. Aggregation risk may also oblige bidders to bid beyond their initial business case, so as to protect synergies, so could perversely drive revenue upwards.

As a general observation, it is apparent that the majority of value at the national level will come from spectrum covering the largest 25 or so major metropolitan areas. On this basis, one may suppose that the positive contribution to revenues from participation of rural operators is likely to be modest, even if it is substantial within a particular area. The larger uplifts in revenues identified by Wallsten and others are almost certainly influenced more by the dynamics of competition for metro areas than increased participation at the rural level.

In conclusion, we have not identified concrete evidence that increasing the number of regional areas would adversely affect auction revenues from the Forward Auction. If it increases participation without deterring larger bidders, it seems likely that it would increase revenues, although the revenue contribution from increased participation at the rural level would likely be modest as a proportion of total revenues.

4. Managing complexity of auction implementation

The FCC's primary concern with increasing the number of licenses appears to be related to the complexity of implementing the Forward Auction. It would be helpful, in this regard, if the FCC could provide more detail about its specific concerns, so as to facilitate stakeholder comment. In our analysis above, we identified four possible implementation concerns related to the number of licenses, but none appear insurmountable.

The FCC has not provided any evidence to suggest that there is a maximum number of licenses that could be sold using the FCC design for the Forward Auction. However, there are implementation risks that increase with an expansion in the number of geographic areas. Given the importance that the FCC and Congress attach to the Incentive Auction being a success, it is perhaps not surprising that the FCC prefers to license on the basis of 176 EAs rather than 700+ CMAs. In this respect, the PEA approach (or some variant thereof that structures the auction in a more granular way than EAs) could provide a compromise, as it opens up scope for an intermediate increase in the number of licenses.

5. Public policy obligations

The FCC is under certain legal obligations to consider the interests of small and rural operators, and their actual or potential customers, in determining the appropriate level of geographic area licensing.⁶⁵ For the Forward Auction, there is substantial evidence available that licensing spectrum at the EA level would restrict economic opportunities for many local operators. As discussed previously, this implies a strong case for the FCC to adopt smaller area licensing

⁶⁵ See 47 U.S.C. § 309(j).

unless it identifies countervailing arguments for EA licensing based on the “*public interest, convenience, and necessity*” and “*the characteristics of the proposed service.*”⁶⁶

E. Conclusion: There is no ideal approach in the context of a single auction

Our analysis of the pros and cons of using particular tiers of geographic license areas suggests a strong case on both economic and public policy grounds for moving from EAs to smaller license areas. However, we also observe that there are downsides to expanding the number of licenses, notably with respect to auction implementation and geographic exposure risk. We doubt there is any approach based on geographic licensing within a single auction that could entirely resolve this dilemma.

We see no reason why the auction design proposed by the FCC could not be adapted to support many more license areas than the 176 Economic Areas currently proposed. It could probably be made to work for an auction of all 734 CMAs, but we recognize this would not be ideal from a perspective of managing implementation risks. This suggests a strong case for the FCC to explore further proposals for PEAs that could right-size license areas using a mix of EA and CMA boundaries. Although the current PEA proposals may not (as yet) achieve the goal of facilitating potential participation by all or most smaller operators, it seems plausible that some future variation of this proposal could achieve this.

⁶⁶ 47 U.S.C. § 309(j)(7)(A).

IV. “Sequential Forward Auctions” – an alternative approach

In Section II, we discussed the difficulty in reconciling the competing arguments for and against using smaller area licenses. Ultimately the FCC will have to decide on the approach that it believes maximizes broader benefits, even if this is to the detriment of some stakeholders. This raises an obvious question: is there a way that the FCC could change the framework for the Forward Auction, so as to accommodate the interests of a broader range of stakeholders?

In this section, we explore a possible approach, in which the Forward Auction is divided into two sequential bidding phases, consisting of an auction for urban areas primarily based on the EA licensing structure, followed by a second phase of bidding for rural areas, primarily based on the RSA licensing structure. We call this the Sequential Forward Auctions approach. For the avoidance of doubt, we propose that both auctions remain part of the broader Incentive Auction, and that bidders have the opportunity to make a single application to participate in both phases. The assignment round for award of specific frequencies to winning bidders from the Forward Auction could take place as planned after completion of the two bidding phases.

The format and process for the First Phase Forward Auction would be the same as for the single Forward Auction currently proposed by the FCC, with the only substantive change being to the lot structure. For the Second Phase Forward Auction, there is more scope for changes to auction rules and timing, although we envisage that the same ascending clock auction format could be used. We describe the process for each auction in more detail below. We precede this with a general discussion of the scope for “right-sizing” licenses using a variant on the PEA proposal, which we consider complementary to and largely consistent with our approach.

A. Right-sizing licenses

We borrow the term “right-sizing” licenses from the paper on geographic area licensing produced by the Summit Ridge Group.⁶⁷ This paper apparently served as an inspiration for the proposal by CCA for the introduction of PEAs as an intermediate tier level between EAs and CMAs.⁶⁸ In the debate between stakeholders on the right size of license areas, it is apparent that current geographic tier choices are not always a good fit with the demands of existing operators. If spectrum is sold exclusively at the EA level, then many small operators may be *de facto* excluded from bidding. On the other hand, there may be many parts of the country where all potential bidders would be satisfied with EA level licensing or favor only a partial disaggregation of EAs. PEAs provide a framework for the FCC to restructure the available licenses so they are more consistent with operator needs within the framework of existing geographic tier boundaries.

The specific proposal for PEA boundaries submitted by CCA is just one of many possible approaches the FCC could take to defining this new tier level. As previously noted, the current

⁶⁷ Summit Report.

⁶⁸ CCA Ex Parte.

proposal would likely work for some smaller operators but not for others. However, with further changes, it should be possible to define an alternative PEA approach that satisfies all or most stakeholders while minimizing the increase in the number of licenses. Put differently, the objective of the process would be to define geographic license areas that are more compatible with the principle of allowing all bidders to bid for and acquire spectrum across areas that they believe are coherent economic markets for rolling out mobile wireless services.

As a starting point for considering how regions might be “right-sized,” it is helpful to consider the likely needs of existing operators. These operators fall into two broad categories: national and large regional operators; and smaller, local operators. In the first category, operators may be interested in acquiring spectrum in urban and rural areas, but their business cases will likely rest on acquiring a critical mass of coverage in major metropolitan areas. In the second category, small operators are primarily located in rural areas and some small metropolitan nodes, and will likely be seeking opportunities to replicate or modestly expand existing footprints; such bidders are unlikely to target major metropolitan areas. (Ideally, the FCC should also consider the interests of potential new entrants, but given uncertainty over scope for entry in the Forward Auction, we do not focus on this issue.) This suggests that, within any EA, there is a strong case for splitting out some smaller metropolitan areas and rural areas, but not for separating major metropolitan areas.

Accordingly, we propose that the FCC define a new PEA geographic tier level, based on an analysis of likely demand at the CMA and EA levels. This would be used solely for the purpose of defining lots in the auction. Actual licenses could still be awarded at the CMA level, so as to avoid the need to disaggregate licenses in case of demand for leasing and sales in the secondary market.

The new PEA tier structure could be driven by stakeholder demand. However, to facilitate the process it may be helpful if the FCC first identifies default rules for the new license structure that it would implement absent firm evidence that an alternative approach for a CMA or group of CMAs offers benefits. This starting point should be one likely to facilitate broad participation in the auction. For example, the FCC might consider the following rules:

- All MSAs within an EA would normally be included in the same PEA;
- RSAs would normally be defined as standalone licenses; and
- In case there are predictable constraints on supply in some but not all CMAs within an EA (e.g. owing to cross-border interference), priority would be given to awarding these areas as separate PEAs.

Stakeholders would have the opportunity to petition for variations to these rules. When reviewing petitions, the FCC might reasonably place greater weight on petitions that make it easier for small operators to replicate or modestly expand an existing operating footprint, for example by linking together some RSAs; or separate metro areas that are not geographically adjacent.

We do not anticipate that the FCC would normally allow linkages between RSAs and MSAs in different EAs although exceptions might be possible if a convincing economic case was submitted by a petitioner. The approach of delineating licenses in this way is facilitated by the fact that almost all MSAs nest inside EAs and, within EA boundaries, metropolitan areas are, more often than not, geographically contiguous. According to research provided to us by RWA, only three CMAs cover territory that lies across an EA border.⁶⁹ Furthermore, amongst the 152 EAs that include urban areas, only 68 include more than one MSA region. Amongst these we count only 14 cases of EA boundaries that include MSAs that are not geographically contiguous.⁷⁰ These points are illustrated in the maps attached as Exhibits 5 and 6. The fact that RSAs are often not nested within EAs is irrelevant given that they do not, by definition, overlap with MSAs.

As we describe below, this alternative PEA approach would not greatly change the number of regions containing metro areas, but may significantly increase the number of regions covering rural areas. This is deliberate. By limiting the number of metro areas, we can prevent increased risk for larger bidders and limit implementation worries. Meanwhile, concerns associated with expanding the number of rural licenses are mitigated by bifurcating and sequencing the bidding process, as described below.

B. First Phase Forward Auction (metropolitan areas)

We describe here the proposed approach for the First Phase Forward Auction. Our proposal is that this bidding phase be implemented using the same format and timing as the current proposals for a single Forward Auction. The only change is with respect to the definition and availability of geographic licenses.

1. Lot structure

We propose that only PEAs containing metro spectrum (i.e. one or more MSA regions) be included in the First Phase Forward Auction. Such regions will cover the vast majority of the US population. For example, if the default approach for defining metro PEAs described above is adopted uniformly, then there would be 152 regions covering a population of 220 million, about 77% of the U.S. population. This is a modest reduction from the 176 Economic Areas currently proposed, as some 24 EAs cover territory that does not include any metropolitan population (there are 23 exclusively rural EAs and one that covers the Gulf of Mexico, which has no permanent population).

A map illustrating the location of all MSAs, and the boundaries of the 152 Economic Areas containing them, is provided as Exhibit 3.

⁶⁹ RWA/NTCA Ex Parte, p. 2. These CMAs are: #48 in Ohio / Michigan, which straddles the border of EA 56 and EA 57; #78 in Michigan, which straddles the border of EA 57 and EA 62; and #156 in Maine / New Hampshire, which straddles the border of EA 2 and EA 3. They are illustrated in green in Exhibit 3.

⁷⁰ These observations are based on a manual count and may be subject to minor error.

2. Timing

The timing of the First Phase Forward Auction is unaffected by the adjustments to the license areas. We assume that it would take place in parallel with the Reverse Auction and would be linked directly to supply scenarios, as envisaged in the current proposals.

3. Auction format and implementation

The choice of auction format and detailed rules for the First Phase Forward Auction is unaffected by the adjustments to the license areas. There should be no impact on auction implementation as the number of license areas will not change significantly from that currently proposed.

C. Second Phase Forward Auction (rural areas)

We describe here the proposed approach for the Second Phase Forward Auction. In this case, there may be many more license areas than in the first auction phase. There is also greater scope for variations to format and timing, although we do not propose major deviations from the broad Incentive Auction structure.

1. Lot structure

The number of license areas in this auction would depend on the outcome of the PEA redistricting process. The maximum number is 428. However, we expect this number will shrink owing to successful petitions to merge some RSAs together or with adjacent MSAs. Unlike MSAs, there are many RSAs that do not nest within EA boundaries. However, this creates no issues for the award, as by definition, RSAs dovetail exactly with the MSA territories (and any RSA territories) that would be assigned in the First Phase Forward Auction.

Although 428 license areas is not a high number when compared to many past FCC auctions, it is still a complicating factor from an implementation perspective, for example for national bidders who may be active in many regions. If the FCC is concerned about this issue, it might consider breaking the second auction down into two or three sub-auctions, each covering a large geographic swathe of the United States. Such an approach would have been infeasible for past FCC auctions, as simultaneous award was necessary to accommodate national bidders with synergies between major markets across the United States. However, this constraint is not present here, as the allocation of metro areas would have been already resolved in the First Phase Forward Auction.

A map illustrating the location all RSAs is provided as Exhibit 4.

The number of license areas in the Second Phase Forward Auction could also be expanded to include any CMAs where there is extra supply. This situation may arise because the relevant CMAs were part of a PEA in which supply was constrained in the First Phase Forward Auction, but the constraints (e.g. owing to refusal of broadcasters to release spectrum) applied to some but not all areas within the PEA.

2. Timing

We propose that the Second Phase Forward Auction take place after the First Phase Forward Auction. A key issue to be resolved is whether the Second Phase Forward Auction would take place before or after the supply scenario has been identified.

Delaying the Second Phase Forward Auction until after the supply scenario is fixed would offer a number of benefits to participants:

- *Minimize aggregation risk.* For operators that are active in both metro and rural areas, demand for spectrum in rural areas is often contingent on acquiring spectrum in an adjacent metro region. The reverse is rarely if ever true. By sequencing the two auctions, the risk that a bidder wins an unwanted subset of rural areas without an associated metro area may be largely eliminated. Eliminating such risk means bidders should be better placed to adopt straightforward, valuation-based bid strategies.

In auctions where both MSAs and RSAs are sold simultaneously, aggregation risk may be acute for some bidders. In particular, because demand for rural areas tends to be lower than for urban areas, rural lot categories tend to clear before urban ones, meaning that bidders may be obliged to accept some exposure risk. In the context of an SMRA, this may be partially addressed through staged activity rules and withdrawal rights, but such rules may have undesirable consequences, such as introducing gaming opportunities. We note that there is no provision for such rules in the proposed ascending clock auction format.

- *Mitigate uncertainty over band plan.* Amongst the growing portfolio of spectrum bands used for cellular mobile services, it is as yet unclear how important the 600 MHz band will be. If the fullest amount of spectrum is cleared, it may emerge as the single most important low-frequency band for mobile broadband provision, used by all or most operators, and compatible with all handsets. On the other hand, if less spectrum is cleared, it may be a more niche band, used by only some providers and compatible with only some handsets. Large national operators, such as AT&T and Verizon, can to a significant extent internalize this risk, because handset manufacturers will tailor equipment based on the bands they want to use. This is not true for smaller, rural operators, who are technology takers. Such bidders may benefit greatly from knowing the supply scenario cannot change before they have to submit bids.
- *Mitigate uncertainty over roaming partners.* Small U.S. operators rely on roaming deals with national operators to ensure their customers can use their phones across the United States. This, in turn, guides the choice of network equipment vendors for rural carriers as well as the availability of handsets that may be provided to and used by their customers. In determining whether to bid for 600 MHz spectrum, a key component of the valuation case is whether a current or potential roaming partner will be present in the same band. Sequencing the auctions means small operators have this information, and can take this into account in their valuations.

However, there is also a downside to this approach. The revenues from the Second Phase Forward Auction would not be realized until after the supply scenario is determined, and could therefore not be taken into account specifically in the determination of whether a particular scenario is viable. Most likely, the downside is small. As we discuss below, we anticipate the revenues from the Second Phase Forward Auction will only be a small fraction – less than 10% – of the total, so it is unlikely this revenue will be crucial in determining the choice of supply scenario.

Furthermore, there are steps that the FCC could take to address concerns about not knowing the revenues from the Second Phase Forward Auction when determining the supply scenario:

- *Forecasting revenues.* The FCC could rely on forecasts of the expected revenue from the Second Phase Forward Auction in its determination of whether to accept a particular supply scenario. As we illustrate in Section V, it is feasible to project likely revenues from the Second Phase Forward Auction, on the basis of revenue splits between metro and rural license areas from past FCC auctions.
- *Advance bids.* The FCC could, at the end of a supply scenario, request bids at reserve price for rural PEA licenses that will feature in the Second Phase Forward Auction. If such bids are binding, subject to the supply scenario being accepted, they would provide both a guaranteed pool of extra revenue and a guide to likely revenues from the Second Phase Forward Auction. Such bids could then carry over to the first round of the Second Phase Forward Auction, when bidding would also be opened up to participants not active in the First Phase Forward Auction.⁷¹

Alternatively, the FCC could, if necessary, hold open the outcome of the Incentive Auction until the Second Phase Forward Auction is resolved. In this case, it might need to run the main bidding process for a number of diminishing supply scenarios, but hold open the bids and outcome of the penultimate supply scenario pending conclusion of the Second Phase Forward Auction. However, we are concerned that this approach may be cumbersome and leave bidders in all the auctions, including the Reverse Auction, facing undue uncertainty over the outcome.

3. Auction format

For the purposes of this report, we assume that a single ascending clock auction, with similar rules to the First Phase Forward Auction, would be used for the second bidding phase as well. However, in the case that the Second Phase Forward Auction is detached from the process of determining the supply scenario, it is not strictly necessary that it use the same format as the First Phase Forward Auction.

⁷¹ This step would only be required if a supply scenario is close to clearing and the revenues from the Second Phase Forward Auction could be decisive. We propose that such bids be limited to participants in the First Phase Forward Auction, as to obligate rural bidders to participate at this stage may weaken some of the advantages of the sequential process described above.

Exhibit 3: Map of MSAs with EA Boundaries, a potential basis for defining lots in the First Phase Forward Auction

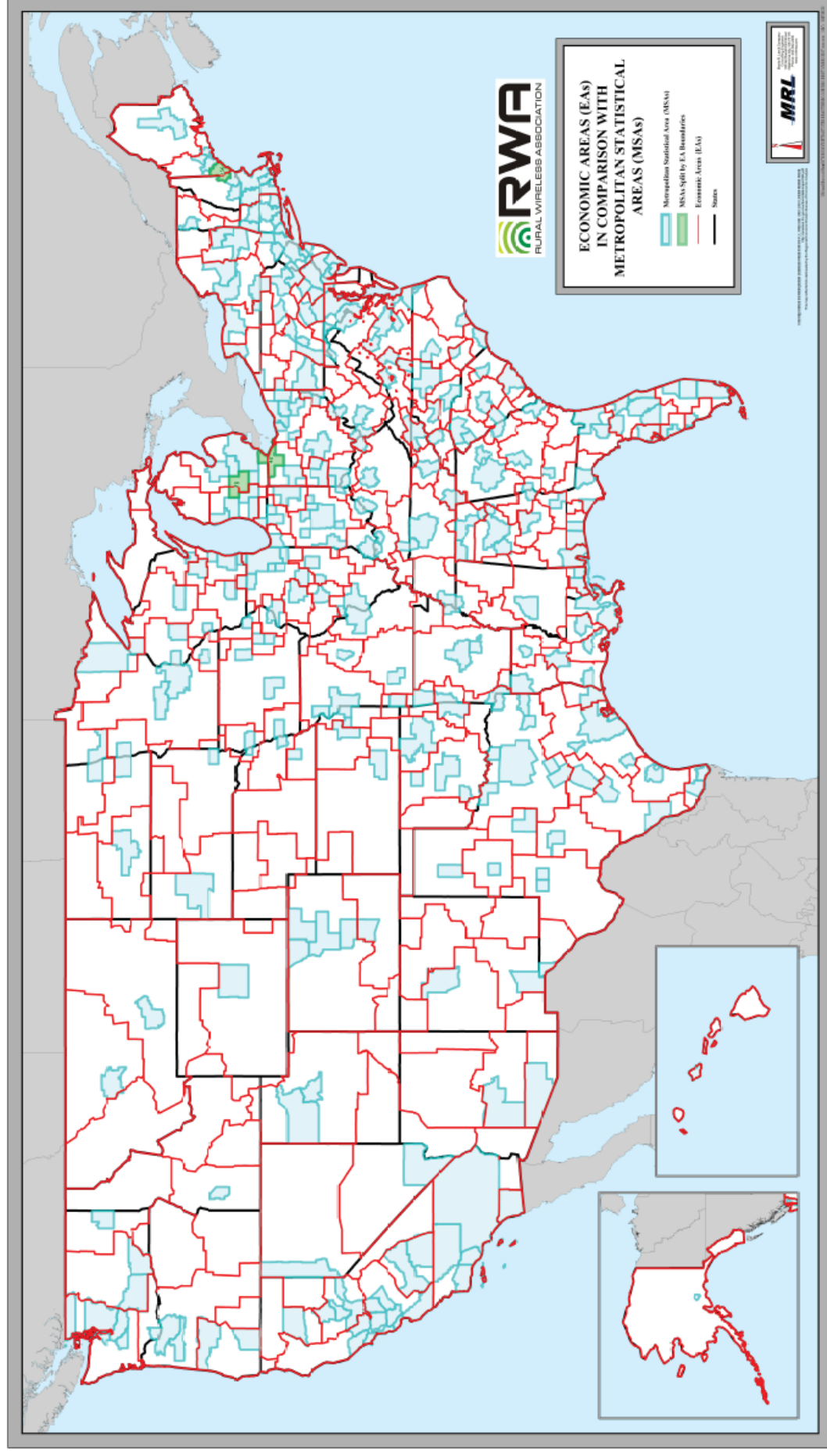


Exhibit 4: Map of RSAs, which represents the maximum number of license areas for Second Phase Forward Auction

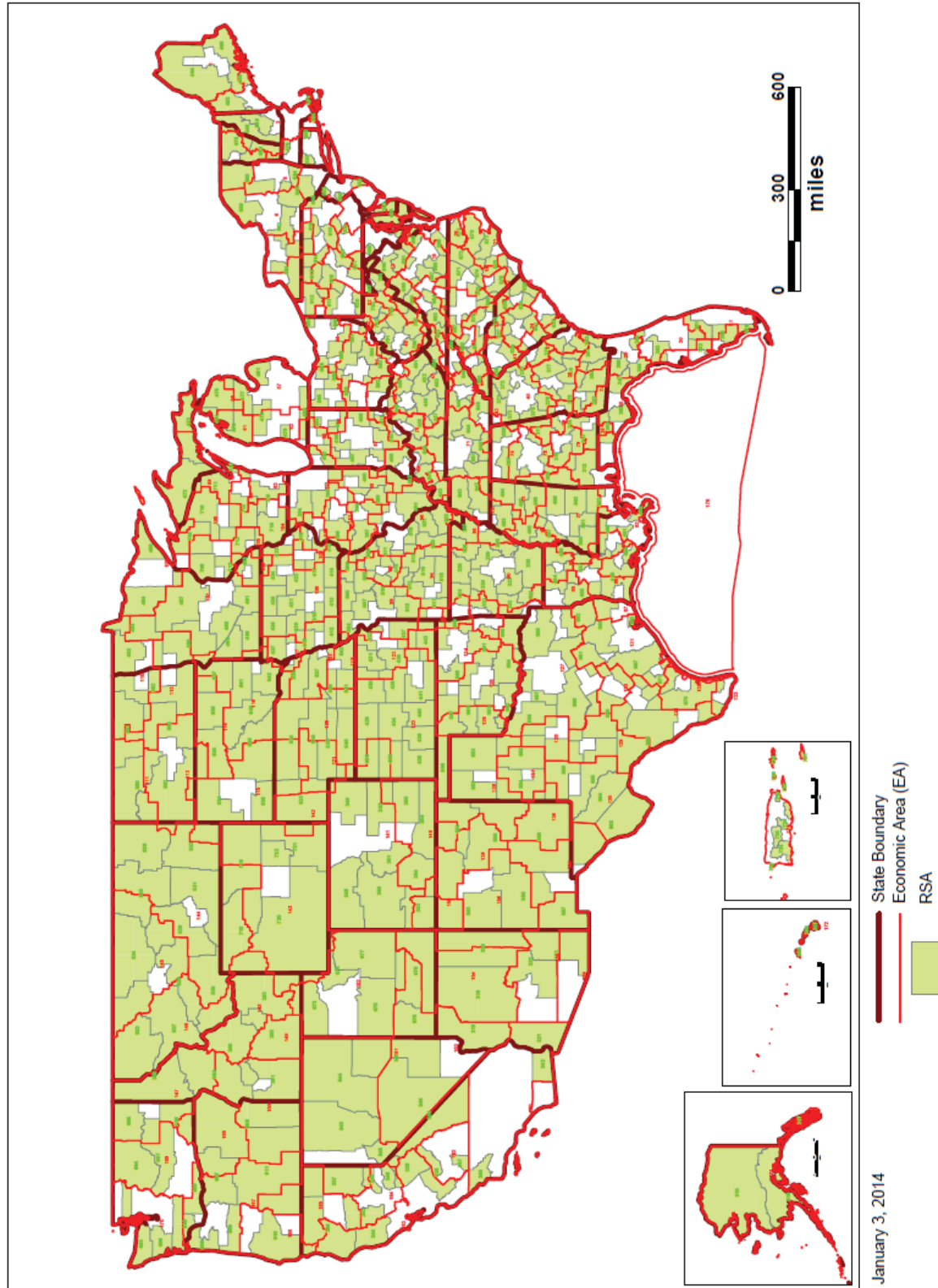


Exhibit 5: Map showing number and location of EAs which contain more than one MSA

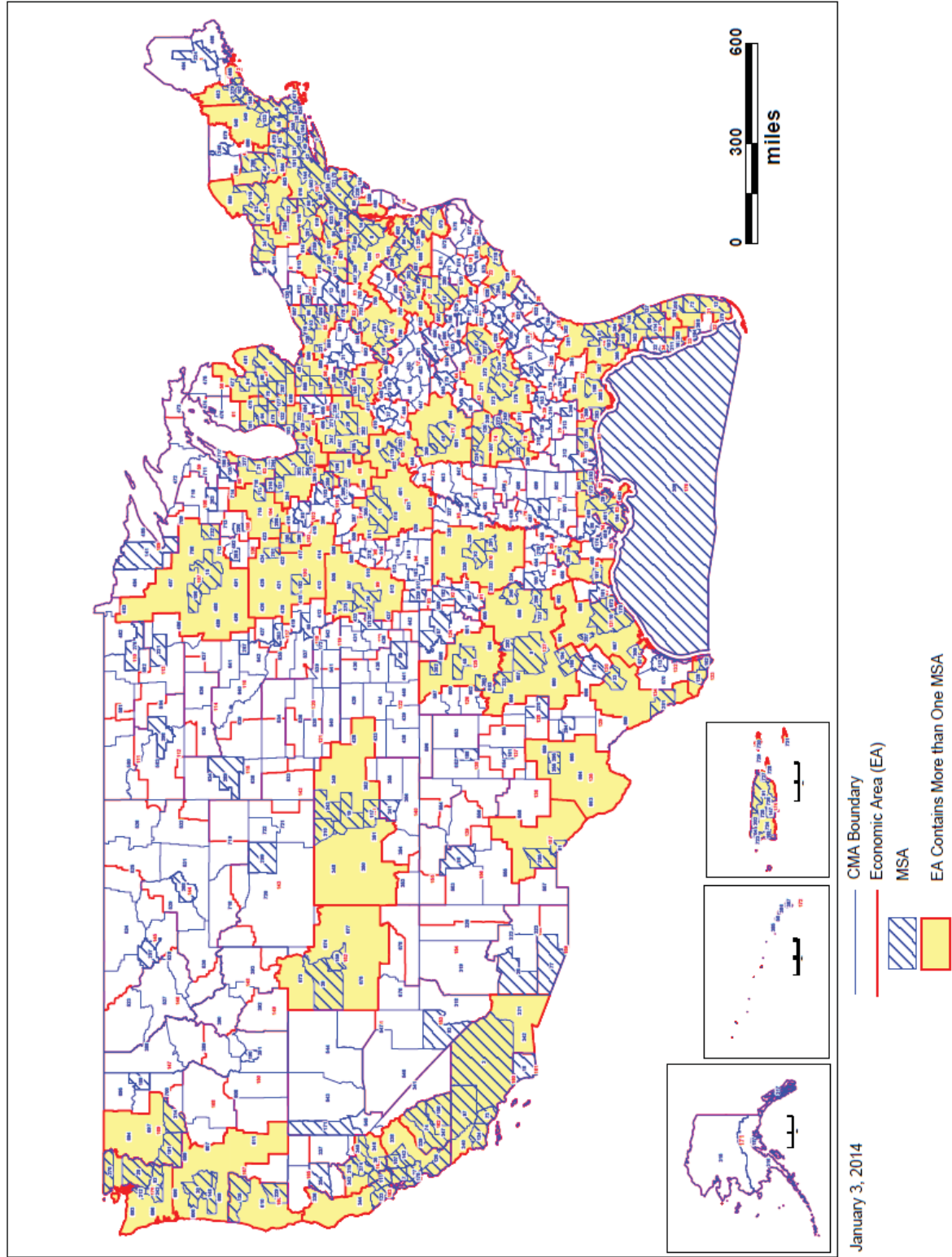
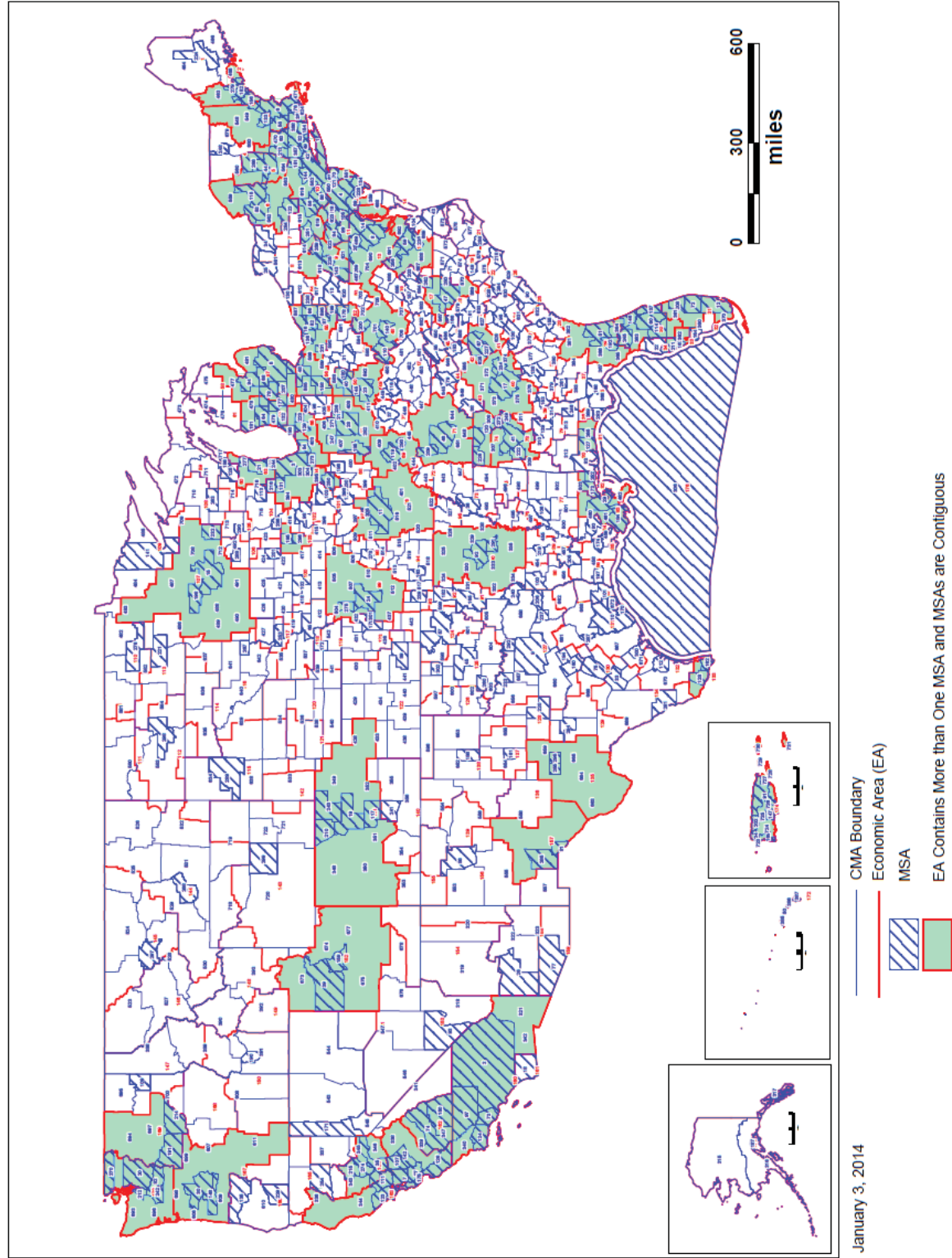


Exhibit 6: Map showing number and location of EAs which contain contiguous MSAs



V. Evaluation of the Sequential Forward Auctions approach versus other geographic licensing approaches

In this section, we evaluate the Sequential Forward Auctions approach based on the same criteria that we developed in Section II. We conclude that the Sequential Forward Auctions approach is potentially highly effective in realizing the advantages associated with having more, smaller area licenses, while mitigating the concerns associated with moving away from an EA license structure.

A. Stage 1a evaluation: Impact on arguments for smaller licenses

The Sequential Forward Auctions structure has the potential to provide all the benefits associated with using smaller area licenses. It has the potential to:

- Promote participation in the auction.** The approach of “right sizing” licenses using CMAs as a base unit, but linking together metro regions and some rural regions into larger EA-based licenses, has the potential to ensure that no existing operator is excluded from participating in the auction because it cannot match its existing footprint. As an illustration, Table 4 below describes how this approach might facilitate participation by the local operators that we presented in Section III as examples of potential bidders disadvantaged by the use of an EA structure.
- Maximize the role of the market.** The expansion in the number of licenses will significantly expand the range of allocation outcomes that could be realized through the Forward Auction. Given that our stakeholder-led PEA structure would constrain the number of licenses, it would still be more restrictive than a pure CMA approach. However, provided that license areas are right-sized based on honest stakeholder responses, the likelihood that an efficient market outcome is excluded should be minimal.
- Meet FCC obligations with regard to supporting rural operators.** With respect to geographic license areas, this approach appears to fulfill the FCC’s obligations regarding support to small and rural operators, and their customers. Indeed, it may be even more effective than simply adopting a CMA-license structure, as it allows for licenses to be right-sized, based on evidence of real demand. For example, it allows for the possibility that some local MSAs and RSAs (within an EA) be awarded as a single PEA, which may mitigate aggregation risk for some bidders, while also ensuring that other complementary RSAs can be bid on individually.
- Allow for more granular deployment of reclaimed spectrum.** The expansion in the number of license areas, especially in rural areas along the Canadian and Mexican borders are sold as separate PEAs, may allow for a more granular approach to deployment of reclaimed spectrum. To the extent that local area constraints on spectrum availability are predictable, this can be taken into consideration when the FCC defines the borders of PEAs. Although in the First Phase Forward Auction, it may be necessary to restrict supply across a PEA to the lowest common denominator, if some CMAs within

the PEA are unimpaired, the extra supply can be added to the Second Phase Forward Auction.

Table 4: Illustrative examples of how the Sequential Forward Auctions approach may facilitate participation by local bidders

Leaco Rural Telephone Cooperative, Inc.

If spectrum were sold at the CMA level, Leaco would be able to cover its entire footprint by purchasing 1 MSA (10% of its customer base) and 11 RSAs (the remaining 90%). These areas are a good match with its operating footprint and should all be plausible targets.

Through the process of right-sizing, Leaco might also petition for some of the adjacent regions in which it operates to be merged into larger PEAs. For example:

- It might request that its two adjoining rural territories in California, #342 and #341, be merged (both are part of EA 160); and
- It might request that its four target rural territories in the Rocky Mountain region, #677, #348, #350 and #363 be merged.

It could further request linkages across its territories in Texas, but a successful petition is probably less likely here given these territories are spread over a wide area and might alternatively be linked to other metropolitan areas outside Leaco's footprint.

NEP Wireless, Inc.

If spectrum were sold on the CMA level, NEP would be able to cover over 95% of its entire footprint by successfully bidding on 1 MSA and 1 RSA. These areas are a good match with its operating footprint and should all be plausible targets.

Through the process of right-sizing, NEP might also petition for one of the smallest MSAs that is nearly isolated be separated from its EA boundary and auctioned in the second phase.

Additionally, it might request that this MSA be merged with a neighboring RSA into a larger PEA. For example:

- It might request that CMA #122 be separated from EA #10 as this PEA is surrounded almost solely by rural areas.
- It might also request that CMA #122 and a neighboring license area, CMA #616, be merged into a larger PEA.

This would provide NEP with a competitive balance needed to participate in the auction and secure spectrum to ensure continued rollout of advanced technologies in their service area.

Pinpoint Wireless, Inc.

If spectrum were sold at the CMA level, Pinpoint would only need to successfully bid on 2 smaller RSAs to cover its entire operating footprint. Licensing spectrum at the CMA level works perfectly for Pinpoint without the need of any additional “right sizing.”

Union Wireless

If spectrum were sold at the CMA level, Union would be able to cover its entire footprint by purchasing 2 MSAs (about 15% of the total) and 17 RSAs. These areas are a good match with its operating footprint and should all be plausible targets.

Through the process of right-sizing, Union might petition for some of the adjacent regions in which it operates to be merged into larger PEAs. For example:

- Union serves the whole of Wyoming. It might request that its main metro area, Casper (#299) is linked to the surrounding five RSAs; and
- Union also serves a number of adjacent rural areas in Utah and Idaho. It might request that these areas be merged into a single license area.

B. Stage 1b evaluation: Impact on arguments for larger licenses

The sequential structure also realizes most of the benefits associated with using EA licensing. It has the potential to:

- **Reduce aggregation risk.** Sequencing the sale of rural areas after urban areas has the potential to reduce aggregation risk for many bidders. The structure of the First Phase Forward Auction looks very similar to the original FCC proposal for EA licensing, with a similar number of licenses. As such, aggregation risk for large bidders is essentially unchanged and may even be modestly diminished. With all metro areas available in the First Phase Forward Auction, large bidders are in a similar position with regards to acquiring a critical mass population coverage nationwide. Furthermore, their exposure to winning an unwanted subset of their demand should be reduced, as they no longer need to make a decision on whether to bid for rural licenses until they know whether or not they have a complementary urban footprint.

Sequencing can only increase aggregation risk if there are bidders whose demand in the First Phase Forward Auction depends on conjecture of outcome in the Second Phase Forward Auction. Given that most existing operators are either large national / regional bidders or small, rural players, we suppose that there will be few operators that are in this position. However, to the extent that any potential concerns are identified, it may be possible to mitigate them through the process of redefining PEAs.

- **Constrain opportunities for gaming behavior.** To the extent that opportunities for gaming are linked to the number or type of geographic licenses, the bifurcation of the Forward Auction should ease concerns. From a gaming perspective, the profile of the First Phase Forward Auction looks little different from an EA based auction. The likelihood of gaming in the Second Phase Forward Auction may be greatly diminished by the nature of the available lots: lower value, rural regions.
- **Avoid undue auction complexity.** A key benefit from bifurcating the Forward Auction is that it isolates the First Phase Forward Auction from any concerns about implementation complexity due to the increased number of licenses. From an implementation perspective, the First Phase Forward Auction has essentially the same profile as the FCC's currently proposed Single Forward Auction, and may even be slightly easier if the number of lots is less. As the First Phase Forward Auction is the one that matters in terms of determining the success of the Incentive Auction, this approach essentially de-risks the implementation process.

The FCC would face some new implementation challenges. Firstly, it will have to manage the process for defining PEAs. However, in opening up the existing PEA proposal to consultation, it has already initiated this process, and there is still plenty of time for boundaries to be redrawn prior to a 2015 auction. The process may also be eased by setting clear default rules for PEA definitions, for example as proposed in Section IV, in advance of receiving stakeholder submissions. Secondly, it must implement an additional bidding phase, the Second Phase Forward Auction. This bidding phase may feature a large number of license areas, so is potentially complicated from an implementation perspective. However, the process is low risk, because under our proposal, the outcome will not affect the broader conduct of the Incentive Auction.

C. Stage 2 evaluation: Public policy rationale

The Sequential Forward Auctions approach performs very well against the five criteria that should be of particular importance for the FCC:

- **Economic efficiency.** The likelihood of achieving an outcome that maximizes economic efficiency appears greater with the Sequential Forward Auctions approach than with the existing proposal under either an EA or CMA licensing scheme. By facilitating bidding for a broader range of geographic areas, our approach is likely to promote participation relative to EA level licensing. Although market outcomes are constrained relative to a pure CMA approach, because licenses are right-sized based on stakeholder responses, the risk that more efficient outcomes are excluded should be small. Finally, aggregation risk should in general be reduced relative to either an EA- or CMA-based approach, owing to the right-sizing of licenses and sequencing of the sale of rural lots after metro regions have been assigned.
- **Promotion of sustainable downstream competition.** The Sequential Forward Auctions approach offers clear benefits with respect to scope for promoting outcomes that support

competition in local and rural areas. It may even be more effective than a pure CMA approach, as the right-sizing of licenses and bifurcation of the auctions means that bidders are less exposed to stranded license risk. Moreover, in the Second Phase Forward Auction, all bidders will be solely focused on their business case for rural areas, with larger bidders no longer distracted by higher value metro regions.

- **Raising revenue.** We do not expect the changes we propose to have a significant impact on overall revenues from the Forward Auction. This is because the changes primarily facilitate participation by smaller bidders, focused on rural and minor metro areas, which account for only a small proportion of national value in dollar terms, and the majority of auction revenues (90%) will be garnered from the First Phase Forward Auction. Nevertheless, given that our proposals should be positive for participation and decrease aggregation risk for all bidders to varying degrees, it seems more likely than not that the overall impact will be positive.

Bifurcation of the auction does create a possible concern with respect to the identification of revenues necessary to determine if a particular supply scenario clears. Specifically, because we propose to run the Second Phase Forward Auction only after the Reverse Auction and First Phase Forward Auction have been resolved, the FCC must make a decision on the supply scenario without knowing the amount of additional revenues from the Second Phase Forward Auction. This is a timing issue that can be managed. Firstly, an analysis of past FCC auctions for wireless mobile spectrum that have used CMA licenses, presented in Table 5, suggests that the aggregate value of spectrum in all RSAs will be less than 10% of the total and thus the contribution to whether any particular supply scenario is successful is likely to be small. Through the process of right-sizing, we anticipate that some RSA areas will remain part of metro-based PEAs included in the First Phase Forward Auction, so the actual value associated with the Second Phase Forward Auction will be even lower than this. Secondly, as discussed in the previous section, if necessary, the FCC could request some binding applications at reserve for rural PEAs and/or take account of forecast revenue in determining whether to accept a supply scenario or not.

Table 5: Revenue split from rural areas as % of total from past FCC auctions

| Auction | CMA Licenses | MSA Licenses | RSA Licenses | Total Spent on MSA Licenses (\$m) | Total Spent on RSA Licenses (\$m) | RSA Spent as % of Total CMA Spent |
|-----------------|--------------|--------------|--------------|-----------------------------------|-----------------------------------|-----------------------------------|
| 66 ¹ | 712 | 303 | 409 | 2,106 | 141 | 6.7% |
| 73 ² | 728 | 303 | 425 | 8,555 | 514 | 6.0% |

Notes: ¹Advanced Wireless Services (AWS I) – 9/2006; ² 700 MHz Band – 3/2008.

Source: FCC Auctions Website

- **Managing complexity of auction implementation.** The Sequential Forward Auction process allows for a significant increase in the total number of geographic licenses, but without any increase in implementation complexity for the First Phase Forward Auction. There are new challenges for the FCC: right-sizing licenses; and managing a second

bidding phase for rural areas. However, the process of right-sizing licenses takes place before applications, and we propose that the Second Phase Forward Auction takes place only once the main elements of the Incentive Auction, including determination of the supply scenario, have been concluded. In summary, we believe that this process has the potential to address the FCC's auction implementation concerns without the need to constrain geographic licensing to the EA level.

- **Public policy obligations.** As discussed above, the approach appears to satisfy the FCC's policy obligations not to exclude without good reason small and rural operators from participating in the auction, while avoiding the need to shift entirely to CMA license areas.

D. Conclusions

The Sequential Forward Auctions approach performs very well in an evaluation of the criteria that matter to bidders and the FCC. Through an expansion in the number of licenses, it addresses concerns about participation of small bidders and the role of the market in determining allocation. It also supports a more granular approach to deployment of reclaimed spectrum. By right-sizing licenses based on operator demands and sequencing the sale of rural licenses after metro ones, it should reduce aggregation risk, in particular relative to a CMA-based approach but also relative to an EA approach. Overall, the Sequential Forward Auctions approach appears better placed to ensure an efficient allocation outcome, especially with respect to promoting allocation of spectrum in rural areas and minor metropolitan areas to competing carriers.

From an implementation perspective, a major advantage of sequencing the Forward Auction is that it facilitates an expansion in the number of licenses without increasing implementation risk. Under our proposal, the number of metro regions in the First Phase Forward Auction would likely number less than the current 176 EAs. This should make it straightforward to run the First Phase Forward Auction in parallel with the Reverse Auction. Any complexity in terms of dealing with larger numbers of rural licenses is shifted to the Second Phase Forward Auction, which can take place after the supply scenario has been resolved. As revenues associated with the first auction are likely to be more than 90% of the total, this bifurcation is most unlikely to impact on the supply scenario, and if this was a concern, revenues could be forecast with reasonable certainty.

We conclude that there is a strong public policy case for the FCC to consider implementing Sequential Forward Auctions.

VI. The role of package bidding and sequencing

The debate over the appropriate level of geographic licensing has also been linked to a separate discussion over the extent to which package bidding may be permitted in the Forward Auction. The current auction rule proposals do not include any meaningful role for package bidding, either with respect to acquiring lots within a license area or across license areas. However, in Notice 12-268, the FCC asked for public comment on the use of package bidding:

“Bid collection procedures in the forward auction could include provisions for package bidding—that is, bidders could be permitted to indicate a single, all-or-nothing bid amount that would apply to a group of licenses, such as more than one block in a geographic area or the same block in multiple geographic areas. Package bidding could be particularly helpful to bidders that face a risk of winning certain licenses but losing complementary licenses they consider essential to their business plans. Package bidding options generally complicate an auction, although such complexity can be limited if certain restrictions apply to the ways bidders can group licenses. Package bidding could take a number of specific forms, and its feasibility and potential usefulness to bidders would depend on auction design details. We seek comment on whether bidders are likely to have interests, such as those mentioned above, that may be addressed by package bidding, and on how package bidding options might work with the other auction design elements discussed herein.”⁷²

Furthermore, in the PEA PN, the WTB also called for comments on how package bidding might be used with such a licensing scheme:

“Should the Commission offer geographic package bidding to 600 MHz auction bidders in conjunction with a PEA-based licensing approach? If so, how should the package(s) be composed? WTB seeks comment on these issues and, in particular, on the concept of a single package containing the top markets. WTB also seeks comment on the extent to which the licensing and package bidding concepts discussed herein may or may not affect the design of the incentive auction.”⁷³

As the FCC says, the main purpose of introducing package bidding would be to reduce aggregation risk for bidders that have synergies between geographic license areas. Aggregation risks may exist for any bidder, large or small, if they are targeting a footprint spanning multiple license areas. However, in stakeholder responses to date, it is large, national bidders that have tended to focus on this argument. In their responses, AT&T, T-Mobile and Verizon have all argued that it is difficult to acquire a national or regional footprint using smaller geographic area licenses. A further advantage of package bidding for such bidders is that it may also make

⁷² Notice 12-268, p. 22.

⁷³ PEA PN, p. 3.

bidding decisions more straightforward, as they could focus round-by-round decisions on packages without necessarily needing to focus too closely on prices of individual licenses.

In contrast, the FCC notes that “*CCA and smaller carriers oppose the use of package bidding generally and specifically with respect to a package of populous PEAs, contending that most packages would ‘disproportionately burden rural and regional competitive carriers and undermine the benefits of the PEA hybrid proposal.’*”⁷⁴ Our understanding is that the lack of enthusiasm of smaller bidders for package bidding reflects a fear that they will be unable to compete against large package bids submitted by national bidders. Their concern is that large bidders may leverage their strength in major metropolitan areas to ensure they also win spectrum in other regions as well. This is a valid concern even if such bidding behavior is not deliberate: large bidders may simply pay little attention to the value of many individual licenses, especially ones with smaller populations, instead only focusing on them as part of a larger package. As a result, local bidders may lose out, even if their marginal values are actually above their national rivals. This problem is compounded if available packages are inflexible, such that national bidders cannot easily drop individual licenses, without giving up on a broader package option.

For the FCC, a further concern with permitting package bidding across geographic areas is the implementation challenge, especially in the context of an auction that must raise a certain level of revenues to clear a given supply scenario. At the moment, the auction rules are set up such that every bid for every lot in each round is potentially binding, meaning that the FCC can always be sure how much revenue it has raised. If package bidding is introduced, this certainty disappears, as demand for a whole package of lots could disappear, and demand could fall below supply, a situation referred to in the auction literature on clock auctions as “overshoot.” The larger the packages allowed, the greater the potential uncertainty for the FCC and for all bidders about whether a supply scenario will clear. A further complication is the approach to be taken with regards to package bids that are dropped. The current rules allow for individual lot bids to be retained if demand would otherwise fall below supply. The same rule might be applied to package bids, but what if this could only be done at the expense of other individual lot bids being rejected? This problem becomes particularly tricky if packages are flexible and bidders may have overlapping packages.

Package bidding may be easier to implement if the FCC goes down the route of pre-defining a limited number of non-overlapping packages. For example, AT&T has proposed an approach that “*at a minimum...will permit bidders to package up to the top 100 markets.*”⁷⁵ However, such a package would certainly contain some smaller metropolitan areas that are targets for regional carriers, who may then be unable to compete. CCA has alternatively proposed that if the Commission adopts package bidding in conjunction with a PEA-based licensing approach, any package should be “*no more than the ten largest PEAs by population,*”⁷⁶ which are presumably

⁷⁴ PEA PN, p. 3.

⁷⁵ AT&T Ex Parte, p. 3.

⁷⁶ CCA Ex Parte, p. 2.

all regions that smaller bidders will likely not want to target. At this early stage of the debate, the numbers of regions proposed to be included in package bids by different parties appear somewhat arbitrary and are not based on any detailed analysis.

Given the concerns with implementing package bidding, the FCC might want to explore further the scope for sequencing as an alternative means of mitigating aggregation risk. Our proposal for Sequential Forward Auctions with right-sized PEAs would not impede the introduction of package bidding in the First Phase Forward Auction, but may somewhat reduce the need for such intervention. This is because sequential bidding and right-sized licenses should help to ease aggregation risks for all types of bidders. Firstly, by moving rural areas to a second auction phase, the risk for all bidders, large and small, of winning stranded licenses is reduced. Secondly, this move in conjunction with right-sizing licenses should lower aggregation risks at the local level, something that is especially valuable to small bidders but may also be helpful to larger ones.

Our proposal is not designed to address aggregation risks for larger bidders seeking a national footprint. However, such concerns might be eased by introducing sequencing within the First Phase Forward Auction by manipulating the starting times for clocks for different regions. For example, the FCC might start the clocks for bidding on, say, the top 25 PEAs by population, but not start the clocks for bidding on other regions until later in the Forward Auction, when activity on the top 25 is at or close to clearing. In this way, bidders would have good information about their prospects for winning major metropolitan areas before they commit to bidding on smaller metropolitan areas, thereby reducing geographic exposure risk. This may mitigate the specific concern raised by AT&T that *“without package bidding ... a carrier might well get stuck ‘winning’ unwanted licenses because it would have to bid separately for licenses in every geographic area within its footprint. For example, the forward auction in a few cities might conclude early and leave the carrier as a high bidder, while the bidding proceeds to such high levels in other cities that the carrier can no longer afford to remain in those auctions.”*⁷⁷

Such an approach is premised on bidders, especially larger ones, wanting to settle the important lots first. Our observation is that bidders have tended to adopt this approach in past U.S. spectrum auctions, to the extent that the auction rules allowed such behavior. Sequencing, if appropriately managed, is unlikely to disadvantage significantly any bidder because: some bidders are not interested in the upfront clocks; and those that are interested are likely to place little weight on the outcome of the clocks afterwards in how they bid for the upfront clocks. We recognize, however, that there are a number of implementation issues that would need to be worked out to integrate such a rule into the current ascending clock design.

If the FCC is minded to explore further a role for package bidding and/or sequencing in the Forward Auction, a possible way forward may be to seek stakeholder opinion on a region-by-region basis as part of the broader process of right sizing licenses. Specifically, the FCC might ask whether each PEA is suitable for inclusion in a large package bid option and/or should have

⁷⁷ AT&T Ex Parte, p. 2.

its clock start earlier or later within the auction. The numbers currently being floated for lots within a package bid (*e.g.* the top 10 or top 100 metro areas) are clearly arbitrary. Through stakeholder engagement, it may be possible to identify some intermediate number that is acceptable to all parties. As a starting point, the FCC might set certain parameters for the process, such as specifying that packages or early sequencing will be limited to more populous regions and that geographic license areas likely to be a target for local or regional bidders would not normally be included in package options.

VII. Conclusion

The FCC has proposed using EAs as the basis for defining geographic area licenses in the Forward Auction. This proposal is strongly opposed by local operators and their representatives, who argue that EAs are too large and would create an insurmountable obstacle to them participating in the auction. The potential exclusion of local operators is associated with a number of further drawbacks, including potentially foreclosing options for the market to identify the most efficient outcomes and not fulfilling the FCC's policy and statutory obligations towards supporting small and rural operators. EA level licensing also does not allow maximum granularity in determining the availability of reclaimed spectrum.

Local operators and their representatives generally prefer licensing at the CMA level, but this would mean a very large increase in the number of license areas from 176 to 734. There is no fundamental reason why the ascending clock format proposed for the Forward Auction and the broader Incentive Auction design could not be adapted to cope with more licenses. However, adding licenses does gradually raise implementation risks, for example by making bid submission increasingly complicated and slow for large bidders, and may also increase aggregation risk for some types of bidders. With respect to aggregation risk, the main concern is exposure to winning so-called stranded licenses; the risk that a national bidder might not win a critical mass of population coverage is not really changed moving from EA to CMA licensing, because large metro regions remain under either approach.

On balance, the public policy case for expanding the number of geographic areas relative to the current proposals appears strong. However, it would be beneficial to all parties if the FCC could identify an approach that minimizes the necessary increase in numbers of lots and also better controls for the implementation and aggregation risks associated with having more licenses.

A right-sized PEA approach, together with a Sequential Forward Auction approach, would appear to strike the right balance and provide the best potential solution. Through an expansion in the number of licenses based on an amended PEA structure, it addresses concerns about participation of small bidders and the role of the market in determining allocation. Right-sizing licenses based on operator demands and sequencing the sale of rural licenses after metro ones, it should reduce aggregation risk. Sequencing the Forward Auction also facilitates an expansion in the number of licenses without increasing implementation risk. The First Phase Forward Auction has a similar structure to the single Forward Auction with EA licensing, so should be relatively straightforward to implement. As the First Phase Forward Auction should account for more than 90% of total revenues, it is the one that really matters to the success of the broader Incentive Auction. The implementation complexity of dealing with larger numbers of licenses is limited to the Second Phase Forward Auction, which can take place after the supply scenario has been finalized.

The adoption of a Sequential Forward Auction approach with right-sized PEAs would not prevent the introduction of package bidding in the First Phase Forward Auction, but may somewhat reduce the need for such intervention because it greatly reduces stranded license risk. Our proposal is not designed to address aggregation risks for larger bidders seeking a national

footprint. However, such concerns might be eased by introducing sequencing within the First Phase Forward Auction (or even within a single Forward Auction if the sequential approach is rejected) by manipulating the starting times for clocks for different regions. Specifically, the FCC could start the price clocks for large metro regions before smaller metropolitan areas, letting these run to a point when activity is at or close to clearing. In this way, national bidders would not need to start bidding on less valuable regions until they had a good idea how likely they were to win spectrum in the most valuable metro regions.

As a next step, we recommend the FCC engage stakeholders in a deeper debate over the right-sizing of licenses at some PEA level, whether or not specific geographic licenses are suitable for package bidding, and how licenses might be grouped for sequencing purposes. This debate needs to take place at the level of looking within individual EAs. Specifically, we propose that the FCC consider on an EA-by-EA basis to what extent MSAs and RSAs should be disaggregated as PEAs. To simplify the process, we have proposed some default rules that prioritize keeping together MSAs with EA boundaries, while separating most RSAs. This reflects the market reality that national operators' business cases depend on acquiring spectrum in major metropolitan areas, whereas smaller operators generally have non-overlapping footprints focused on minor metropolitan and rural areas.

Appendix I. About NERA Economic Consulting



NERA Economic Consulting (www.nera.com) is a global firm of experts dedicated to applying economic, finance, and quantitative principles to complex business and legal challenges. For over half a century, NERA's economists have been creating strategies, studies, reports, expert testimony, and policy recommendations for government authorities and the world's leading law firms and corporations. We bring academic rigor, objectivity, and real world industry experience to bear on issues arising from competition, regulation, public policy, strategy, finance, and litigation.

NERA's clients value our ability to apply and communicate state-of-the-art approaches clearly and convincingly, our commitment to deliver unbiased findings, and our reputation for quality and independence. Our clients rely on the integrity and skills of our unparalleled team of economists and other experts backed by the resources and reliability of one of the world's largest economic consultancies. With its main office in New York City, NERA serves clients from more than 25 offices across North America, Europe, and Asia Pacific.

NERA is a leading global advisor to government agencies and private-sector companies on market design, including the design and implementation of auctions. We also advise bidders on bid strategy for high stakes auctions and on responses to government consultations on award processes. Our consultants have design and strategy experience with all types of auction formats, including sealed bids, simultaneous multiple round auctions, ascending and descending clock auctions, and combinatorial bidding. Our advice is grounded in a thorough understanding of the academic literature on game theory, and practical experience with all aspects of auction implementation and bidding.

Our auction advisory work spans many industry sectors. NERA pioneered the use of auctions to procure energy for retail customers from existing market resources. We administer solicitations that encourage the development of solar energy. In radio spectrum, our consultants work around the world to implement awards of frequency licenses for mobile telephony, wireless broadband, and other communication services. We are also experts in adapting auction formats to other products and uses, such as airport slots, financial instruments, procurement and trading platforms, and universal service subsidies.

Appendix II. About the Authors



Richard Marsden, Vice President

NERA, New York City

Mr. Marsden has 15 years of experience in microeconomics, political economy, and business consulting. He has managed projects on regulation, competition, public policy, and business strategy for a diverse client base, including regulators and private companies in more than 25 countries across Europe, Asia, Africa, and the Americas. He has particular expertise in auctions and in applying economics to the telecommunications and media sectors. Many of his recent projects at NERA have involved policy advice, auction design, software implementation, and bidder support related to the current wave of spectrum awards worldwide.

Mr. Marsden has undertaken auction projects across a wide range of sectors, including airport slots, broadcasting, gas pipeline capacity, mobile telephony, power generation and renewables, procurement, retail sites, and wireless broadband. His project experience includes the design and implementation of SMRAs, clock auctions and package bid auctions (both multiple-round and sealed bid) for radio spectrum for multiple government clients. Over the last three years, he has led teams providing strategy advice to bidders in more than a dozen awards of 4G/LTE spectrum in countries in Europe, Asia Pacific and North America.

Mr. Marsden presents and publishes frequently on the topics of auctions, spectrum management and allocation. Most recently, he chaired the debate at the 3rd Annual Americas Spectrum Management Conference, in Washington DC, on the design and structure of the Incentive Auction. He is the co-author of a book on broadband regulation (Springer, 2005). He holds an MA with distinction in international political economy and a BA in economics and international relations from the University of Warwick, United Kingdom.



Dr. Chantale LaCasse, Senior Vice President

NERA, Washington DC

Dr. LaCasse is NERA's Energy, Environment, and Network Industries Practice Chair, which covers our telecoms and radio spectrum teams. She has over 15 years of consulting experience and over 20 years of professional experience in matters related to competition and to the design and implementation of auctions, procurement, and bidding processes. She provides advice to governments, regulatory agencies, and utilities on auction design and implementation, and has testified as an expert witness before state regulatory commissions and regulatory agencies.

Dr. LaCasse has advised on all aspects of the design and implementation of competitive bidding processes including:

- Choice of auction formats
- Development of detailed rules and qualification procedures
- Features to promote competition and discourage collusion
- Evaluation of bids
- Processes for efficient implementation including online bidding
- Bid strategy to participants in auctions

Although an important part of her practice concentrates on electric power, Dr. LaCasse has experience working in a range of industries, notably other energy sectors and telecommunications. She has helped clients in a variety of areas, including capacity markets, renewable energy, solar generation projects, allocation of radio spectrum, and legal services. She has worked with clients on the design and management of auctions in the United States, Canada, Spain, Ireland, Belgium, and Singapore.

Before joining NERA in 2001, Dr. LaCasse was an established academic in Canada; she trained PhD students in game theory and conducted research in antitrust, auctions, and other issues in economic policy. She has provided advice on competition issues and has held the TD MacDonald Chair at the Canadian Competition Bureau. She holds a PhD and MA in economics from the University of Western Ontario, as well as a BA in mathematics and a BSocSc in economics from the University of Ottawa.



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